

*Curriculum
Planning
For the
Gifted*

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*To Dorothy, Gail, and Sue
Who Help to Keep My Environment
Delightfully Average*

Joseph Leese

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State University of New York at Albany.*

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Preface

The current emphasis upon educating the gifted may be considered a rebellion against the negative aspects of the modern school. An abundance of evidence clearly demonstrates that the modern school has not yet met the challenge in providing for individual differences, especially among the gifted. Today's school must change its patterns in order to cope with the gifted child's intellectual, physical, emotional, and social needs. A number of obstacles such as overemphasis on the individual's social needs, community pressure, ineffective teaching, inadequate physical facilities, and class size are hindrances to desirable change. Most significant among these barriers is the outmoded curriculum approach.

Most often educators ask, "What shall we teach the gifted?" This question is not easy to answer because of the dearth of research on curriculum content. In spite of this drawback, the function of this volume is to clarify and crystallize some of the answers. This book is designed for teachers, administrators, and curriculum specialists whose task it is to develop concepts and materials for the gifted child whether he is in a regular or special class.

This book is intended to serve not only as a resource compendium but as a basic text for a course entitled, "Curriculum Planning for The Gifted," which can be used at the post-service or in-service level. Such a course is sorely needed to help prepare educators for educating the gifted.

The magnitude of information needed to provide a differentiated education for the gifted is beyond the scope of one or two individuals. Consequently, the joint efforts of a group of educators who are currently experimenting with curriculum were considered essential to insure depth and uniqueness in developing unexplored concepts and reflecting upon old ones in new dimensions. The selection of contributors was intention-

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*Curriculum Planning
For The Gifted*

CHAPTER ONE

Problems and Practices

JOSEPH LEESE

AND

LOUIS A. FLIEGLER

The future of the bright student is undeniably related to the decisions and opportunities provided for him by educators. His development can be guided to optimum levels, or it can be so misused that much of his potential will remain untapped. Upon the curriculum makers rests the prime responsibility of creating a productive climate to insure maximum growth.

In the last several years a widespread feeling has existed that as far as gifted children are concerned the curriculum planners have not been eminently successful. The programs attributed to these planners have been assailed for lack of quality, limited scope, improper focus, and a myriad of other weaknesses. Frequently, the school has produced attitudes and behaviors which have resulted in wasted ability. Many of those who are competent in high-level intellectual tasks drift into employment appropriate for individuals of appreciably less capacity. They are satisfied doing a mediocre job, and as a result, they have no insight into their important life roles.

They see little relationship between their talents and higher attainments of personal satisfaction.

Presently, we have no completely accurate picture on a national scale as to why many of the gifted do not achieve the status in adulthood of which they are capable. However, two inescapable facts are clear and indelible. A surprising number of our superior youths do not complete their studies in high school or college. Coupled with the drop-out problem is a second disturbing fact: many gifted youngsters who graduate from high school do not avail themselves of opportunities for a college education. Whether superior pupils are bound for college or elsewhere, the elementary and secondary schools must stimulate them to use their talents and help them discover the means to put their unique powers to work. Present curriculums fall far short of accomplishing this goal.

Not attending college may not seem important unless we recognize that it is a forceful illustration of our failure to locate and develop many of the most capable youngsters in our society. This fact becomes crucial when manpower statistics indicate that the lag between supply and demand for creative and qualified people is constantly widening. The unprecedented change in technology is straining the supply of available human resources. We are rapidly coming to the point where we can no longer tolerate a continued loss of the gifted individual because he is needed to sustain our way of life.

GAPS AND PRESSURES

In this last decade there has been a decided urgency to improve programs for the gifted. Competition for the exploration of outer space has added immensely to the pressure. Challenging pleas from interested laymen have increased the already vigorous requests for revision from within the teaching profession itself.

The Implication of Urgency

A multitude of ideas have been projected. Some spokesmen would segregate gifted children immediately and confine them to academic studies alone, eliminating from their programs anything not directly calculated to foster their intellectual powers. This sharp rebuke of learning by doing brings a clamor for a restoration of drill and faculty psychology. Also, a number of sweeping changes have been made in administrative, instructional, and guidance practices, but they have been preceded or accompanied by little careful reflection upon what improvements are needed and by very little analysis of whether these revisions are consistent with educational goals.

For instance, we find schools where independence and creative response are considered important, but the project and unit methods have been de-emphasized while fixed subject-matter focus and teacher autocracy have been restored. We hear that youth should be provided extensive opportunity to improve attitudes and skills for leadership, but extracurricular activities have been curtailed and extreme competitiveness revived. The concern for the humanities is emphasized, but the pursuit for scholarships and science contest winners decreases time and interest from the fine and dramatic arts.

Although research has been done on a variety of adaptations for the gifted, the data from carefully controlled studies on the value of many of the proposed adaptations reported in the literature is limited. Outcomes from club programs, seminars, television supplements, and independent study are not well documented. Even in some situations with seemingly well-publicized programs, much of the confidence in support for the activity resides in personal opinion rather than objective evidence. Accelerant groups, for instance, have been labelled and organized on the basis of inadequate criteria of selection. Varieties of language instruction have been started with little exploration of the appropriate time for introducing foreign languages, of the impact on learning a modern language, or of the competence required for foreign language teachers. The school day has been lengthened, additional subjects assigned, and homework increased with little or no investigation as to the impact on child maturation or on the quality of learning. Such inconsistencies create a confusing situation.

Quite a natural part of the haste has been the pronounced concern for shoring up the academic program. The major emphasis in manpower studies has been the immediate need of specially trained personnel. Whether there are enough talents to go around is anybody's guess. One could argue that this nation never had or never will have sufficient quality personnel. But the extraordinary expansion of our technology and the international race for management of the world's resources are presented quite convincingly as reasons for decidedly more provisions for science study, for special scholarship aid to those students who demonstrate power in mathematics and science subjects, and for reduction in activities calculated to cultivate humanistic growth.

As a result, the so-called peripheral subjects are being neglected. Art and music are consistently by-passed; physical and health education occupy a position of lesser eminence; the commitment of the school to dance and dramatics is inadequate. Provisions for social leadership preparation are almost everywhere extracurricular. The overemphasis on the academics indicates that our total vision has been constricted into a focus on a critical but limited problem, without consideration of the broad development of human behavior.

This imbalance can not be tolerated. The need for artists and musicians, for dramatists and actors, and for wise leaders does not diminish because scientific horizons rise. In fact, as technology increases, there is a greater need for artists and musicians to preserve the humanistic and esthetic aspects of life. We have permitted a shamefully inadequate consideration of the aesthetic side of children far too long. We must be particularly vigilant that our small gains secured in the past are not engulfed by a wave of concern for more mathematicians and scientists. These gains will be annulled if the public schools are unable to resist the pressures exerted upon them and accept a passive role.

Obviously, many enthusiastically welcome the returning restraint on public school independence and anticipate that a far more cooperative effort to improve the curriculum will result. Conversely, many are fearful that the trend represents the revival of external controls that will interfere with the freedom of local faculty groups to develop high-quality experience for their select students. They point apprehensively to increased state regulations, proposals for a national examination system, requests for a federal curriculum making bureau, and establishment of standard content for certain subjects.

In the face of this pressure, we have the responsibility to exercise caution and not to retreat from the positive steps taken in recent years. During the thirties, the public schools made substantial progress in extricating themselves from both the demands of the colleges and the influence of the pressure agencies, economic and otherwise. Presently, the schools have again become sensitive to the pronouncements of college spokesmen and to the representations of special groups and individuals. This responsiveness is valuable if it leads to sound realignment and articulation. It is unfortunate, however, if it further promotes the reckless rushing of youth along to graduation, the gearing of recitatorial cram courses to external examinations, and the radical trimming of the high school program to produce solely an academic robot.

The evidence that our schools have been lax seems to justify some of these adjustments. The argument that the school should be used to build the skills needed by the nation is certainly sound. Teaching in science and mathematics at both the elementary and secondary school level has been inadequate. We have also failed to offer a solid sequence in many high schools. Furthermore, our lack of linguists has been emphasized by the emergence of America as a leadership nation on the international scene. The dire consequences of these continued inadequacies have caught the attention of the Congress as well as a large number of school administrators. Although the need for revision is obvious, we must be aware of how overenthusiasm in the past deluged us and how dire, yet temporary, pressures have brought incongruities, most difficult to correct later.

The disturbing concomitants of the agitation to act swiftly seem to fall into the following general patterns:

1. School leaders have surrendered their convictions about child development concepts they have been building up over the years. As a result, some fundamentally sound policies are being abandoned. Perennial alternatives like the platoon system in the elementary school, kept alive by diehards, have been adopted because of the "trend."

2. Objectives and goals have been inadequately and incompletely examined.

3. Too many adaptations have been made in a kind of desperation. Few proposals have been novel and unique. There has been a premium on mimicry. More of the same has appeared under new labels; that is, what evidence supports the idea that fact-centered college courses, regularly questioned for their value by large numbers of liberal arts students and even greater numbers of specialist-oriented students, are the proper fare for inquisitive and creative adolescents?

4. Changes have been on a mechanical level. Little attention has been given to the climate necessary for encouraging initiative and creativity. Exploration of staff characteristics, qualities, and behaviors related to stimulation and nurturance have been neglected.

5. Planning has been segmented and unorganized. Consideration of total program development has been neglected. The sound purposes and integrity of both elementary and secondary school programs have been threatened.

6. The special and distinct characteristics of the gifted have not been thoroughly considered in planning programs.

7. Long-time effects and influences have not been given adequate treatment. Research and evaluation plans have been neither thoroughly considered in advance nor built into the programs as they have emerged.

8. Opinion formation, decision making, and approval have gravitated into the hands of those whose competence for curriculum planning is seriously to be questioned.

The natural result of this urgency is widespread uncertainty, considerable frustration, and an increasing tension. Some school systems have resorted to indiscriminate borrowing. A few have made minor adaptations in anticipation of the discovery, somewhere, of the "right" answer. Apparently, administrative changes are comparatively easy to make. But obtaining quality education requires more than decisions about schedules and placement. If an experience is to be richer and deeper, educators must stimulate a more creative environment and develop better curriculum designs. Most of all they must have time to develop resources, ideas, and means for experimentation.

No one should expect that revisions and adaptations can be accomplished

without trials and tribulations. Reforms are never easy. The forces of status quo seem ever to be present; even when support for change is widespread, the very complexity of institutions encumbers the desire for change. Progress must be slow especially in the area of the gifted where there are decidedly more questions than answers. Unique and workable ideas must be actively sought. However, before changes and adaptations are made, they should be thoroughly considered and initiated only with great caution. Creative responses, imaginative and penetrating pedagogical generalizations do not evolve in simple fashion. They come reluctantly after false starts, after disappointment and discouragement, and after a period of evaluation and research.

DISCOMFORT OVER SPECIAL PROVISIONS

Regardless of the testimony on personnel shortages, considerable doubt remains about how much more time and effort should be devoted to developing special programs for the gifted. These students, it is argued, are entitled to their share of the teacher's time and to appropriate adaptation to their individual strengths and interests. But more favorable teacher-pupil ratios are disapproved; greater teacher freedom and time to plan are considered unnecessary; and the additional cost of a program requiring special personnel is deemed undemocratic.

Many educators still maintain that all students ought to have exactly the same experiences and the same opportunities. Although they recognize that different levels of ability exist, they do not see this as a reason for different provisions for bright students. Each person has the inherent right in an educational system, they say, to the same exposures to which others are entitled. The way to insure this right is to insist on identical conditions and provisions in all parts of the school program.

This thesis grows from America's passionate dedication to equality of opportunity and from a deep distrust of any arrangement which fosters preferment of one over another. It derives from the premise that effort and application can overcome differences. It draws strength from the abiding conviction that what is good for one ought to be good for another. It rests on the idea that school success confers a significant respectability and social equation. Doubtless, it will take a long time to change those who see only identity as equality or who are fearful that adaptations to difference will somehow deny proper and full opportunity to the less able. Even with adequate demonstration that their apprehension is unfounded, some will cling to the position that different approaches and arrangements in program are wrong.

Related to the identity-equality problem is the thought that special

provisions will tend in time to develop an educated élite, who will engender a kind of closed caste system. In proposals for separating the talented most of the time from the rest of the school population, apprehensive educators feel that the free and open channels now presumed to exist in the American system may be closed off. Cyril Woolcock¹ says, "Elites are not a problem in this country and are not likely to be," but one familiar with the findings of Allison Davis, Lloyd Warner, and Robert Havighurst, revealing the effect of the existing class system on school tests, attitudes, and self-images, is not so likely to dismiss the possibility. We do tolerate and even encourage some élites in art, music, and sports, but the intellectual élite continues to remain a subject of worry. Perhaps it is an apprehension of the possibility that a member of the intellectual élite may become "... influential beyond his area of competence, especially in social political areas."² Perhaps it is an intuitive distrust of the leader who perpetuates leadership and eventually becomes a demagogue.

Such a gnawing doubt is not easy to push aside. The assurances that objective examinations and careful diagnosis, an environment replete with good music, art, and drama, and the general availability of good teachers will guarantee the broad cultivation of intellectual power and sustain democratic attitudes remain unconvincing. The example of the limited-opportunity European school is too close; too many Americans still remember the closed doors abroad that brought them to America.

The demand for safeguards against the development of an intellectual caste will doubtless continue. We cannot expect that concern for the issue will soon dissipate, nor that teachers' and board members' reluctance will disappear. The right to be as good as the next fellow is fervently voiced in the American creed. Anything that serves to emphasize the invidiousness of intellectual difference meets not only with a subtle and intuitive repugnance but very often with open hostility.

Cost

Financial provisions for the handicapped child have been obtained more easily than for the gifted child. Often instruction for the handicapped costs approximately twice as much per pupil as that for the superior child. Transportation, small teacher-pupil ratios, additional equipment and resources, specially trained teachers for the handicapped increase the per pupil expenditure appreciably; this the public does not balk at; on the con-

¹ Cyril Woolcock, "New Approach Needed for the Gifted," *Bulletin to the Schools*, New York State Education Department, May 1959, p. 330.

² Miriam L. Goldberg, A. Harry Passow, and Irving Lorge, "Issues in the Social Education of the Academically Talented," *The Social Education of the Academically Talented*, Ruth W. Gavian, ed. (Washington: National Council for the Social Studies, 1958), p. 1.

trary there has been widespread generosity. At the other end of the spectrum is a different picture. Generally, obtaining support for greater expenditures for the gifted has been extremely difficult. Too many community leaders assume that the gifted can take care of themselves and will rise above obstacles. In fact, using similar logic, many educators see no justification for additional financial outlay for the very bright. Even the proponents for higher quality education, paradoxically, champion reduction in expenditures for the gifted.

Two familiar targets are class size and the teacher specialist. Except in several experimental situations, class size is not reduced for bright children. Sometimes small enrollments are maintained but reduction in numbers is caused by the lack of eligible students rather than a plan to diminish the teacher's load. The teacher specialist is considered quite unnecessary because the kind of education one needs to teach the gifted is not considered distinctive.

On the contrary, specially trained teachers are needed because gifted children require interstimulation from fertile adult minds. Extensive resources are needed to serve their curiosity and whet their appetite for independent learning. Small groups and opportunities for person to person interchange and stimulation from intellectual peers are necessary to explore abstract ideas and to pave new frontiers in thought.

Recently, extensive aid has been provided through the National Defense Act to stimulate experimentation and program development. Many local communities and state legislatures have also recognized the need for an increase in financial expenditures to educate the gifted child. Perhaps the monetary naiveté which has limited progress has begun to decrease. However, it will be a long time before it is completely eliminated.

Scholarship Expansion

Numerous steps are being taken to increase college attendance by establishing more positive patterns and altering attitudes. Most prominent is the impetus of providing scholarships for highly capable students. Yet the approach and results are subject to sharp criticism. Many scholarships are not applied for because of the limitations placed upon the recipient. Wolfe³ argues that restrictions upon scholarship awards ". . . do not increase the number of highly qualified high school graduates who get to college so significantly as would unrestricted programs. . . ." In referring to existing scholarship programs, Plaut⁴ comments: "Although such schol-

³ Dael Wolfe, *America's Resources of Specialized Talent* (New York: Harper and Brothers, 1954), p. 247.

⁴ Richard L. Plaut, *Blueprint for Talent Searching* (New York: National Scholarship Service and Fund for Negro Students, 1957), pp. 3-4.

arship programs are commendable, they are inherently of little help to the culturally deprived groups. The winners of these awards have already demonstrated scholastic ability. They also want to go to college. Most of them would have gone on to college anyway; the financial help simply offered the sure means of getting there."

Distribution of scholarships needs far more careful consideration than it has had. Rather than catering only to a small percentage of winners, scholarships should allow a greater variety of top students a chance to earn a stipend. Assuming that only the top two per cent of our students can contribute to society and deserve scholarship awards while the other eighteen per cent of the top twenty per cent of the total population can shift for themselves is poor planning. Furthermore, "Large enough scholarships—large numbers of them—and campus jobs and loans, based upon promise as well as developed ability, must be made to deprived youngsters who cannot compete in the general scholarship programs."²

Need for scholarship aid is the prime concern, not some ability to pass a rigorous test. The rising tuition rates and cost of living make it difficult not only for low socio-economic families but for many middle socio-economic families to send their youngsters to college. Generally, need can be formulated on this basis: Does the family have sufficient funds to send their youngster to school without creating an undue financial hardship? The interpretation of undue financial hardship can be worked through. The other criteria for determination of need can be readily accomplished once this premise is accepted.

A rather important guideline, which is unfortunately being overlooked today, is the allotment of scholarships for all talents. Society needs all its capable citizens, not just those who can contribute in the scientific areas. Specific restricted scholarships in science and mathematics may impel a number of students to alter their vocational choice to take advantage of the scholarship. The consequence may be a very unhappy citizen who follows a second course which is not in keeping with his major interest.

DIMENSIONS OF A PROGRAM

Some educators are reluctant to use the word *program* to describe what is done for gifted children. They would rather think that a school has a whole program for children and that certain steps are taken within it to adapt to the special characteristics and needs of all students. They likewise see no need either for special programs for the other groups who exhibit exceptional characteristics. This may be merely a disagreement over semantics, for it is common parlance to refer to various parts of a

² *Ibid.*, p. 30.

total school organization as a program. We do have the art program, the physical education program, and the English program. More likely, therefore, discomfiture over *program* comes rather from continued reluctance and resistance to think of a well-planned, well-organized policy with carefully evaluated procedures.

Some of the exception taken to the word *program* comes from the limitation of local conditions. Some schools assume they are too small for any visible and structural adaptation to the needs of the gifted. The staff know that they cannot have so-called homogeneous grade level groups and that special schools are impossible because of location and population. The major, perhaps sole, adaptation possible is individualization of instruction. Students may be identified by the teacher or guidance officer, special trips and learning opportunities may be arranged, even advanced placements tests may be scheduled, but whatever is done seems not to merit the designation *program*. On the other hand, the larger school system can have a fairly well-crystallized set of plans for taking care of the gifted. It may include an official statement of board policy on the part of the Board of Education, a formal set of agreements worked out cooperatively by the staff, special groupings and classes, assigned resource people and teachers, honors classes, and special schools. This distinction of a program between the efforts of large and small school systems seems to beg the central issue. The gifted child in a large or small school has the same degree of ability; he, therefore needs opportunities which are in keeping with his capacities. True, the adaptations may be somewhat different because of the school structure, but the basis for adaptation is still the child and not the locality. Hence, the gifted child needs a special program which demands different activities, content, and application regardless of the size of the school system.

A program for the gifted should be broad in intent. A program that is developed with partial sections in creative writing, or music, or some other talent is not consistent with knowledge that exists about the gifted, nor does it embrace the major goals of education. If the goal is to educate the whole child, obviously this aim can never be achieved through a specific, isolated-talent approach and interest grouping. Such grouping is a segmented attempt and does not deserve to be called a realistic program for the gifted. Although the gifted, as a group, are not equally superior in all traits, generally, they tend to be superior in most characteristics. The uneven pattern of their growth may be more environmentally determined than biologically determined; thus, a more feasible approach would be a comprehensive program in all academic areas and a specific talent program for those youngsters who have developed a high-order interest and ability in certain areas. The emphasis then is on developing the broad scope of an individual's talents rather than his restricted, one-sided abilities.

A good program needs a base of criteria upon which to build immediate and long-range goals. Specific characteristics for a sound program must be carefully spelled out as a foundation for program development. Williams selects thirteen characteristics of an adequate program for the gifted. Briefly, they are as follows:

1. The acceptance of a philosophy of education based upon recognition of individual difference.
2. A clear definition of objectives for the development of talented youth.
3. A concern with the development of a wide variety of talents and with different levels of potential.
4. A systematic program for the discovery of gifted children and youth.
5. The use of the most appropriate and effective methods for developing unusual ability.
6. The use of a wide variety of school and community resources.
7. Periodic study of how to increase the achievement and motivation of talented youth.
8. Provision for continuous training for teachers in improved methods.
9. Development of desirable attitudes toward gifted children through greater understanding.
10. Concern with developing a balanced program of intellectual, emotional, social, cultural, and physical growth of the gifted youngster.
11. Concern for continuity in a program for gifted children.
12. Responsibility for a program fixed on one or more persons and specific funds budgeted for personnel and supplies.
13. A continuous evaluation of the effects and effectiveness of the program.⁶

Organizing Staff Effort

Once the need for a program has been agreed upon, a number of issues emerge. First, there will be problems having to do with how policy can be altered, who will produce resources, how multiple building efforts will be reported and translated to other units in the system, who will teach special classes, and who will supervise teacher activities. Secondly, consideration must be given to whether committees are to be set up, how long special study groups may be expected to work, what kinds of reports may be anticipated, and who will attend workshops and conferences.

The issues of larger scope must be resolved in the central office of the school system. Attempts to develop better subject courses may impose the need for an all-system study group. Policies and techniques for identifying

⁶ Clifford W. Williams, "Characteristics and Objectives of a Program for the Gifted," *Education for the Gifted*, Fifty-Seventh Yearbook of the National Society for the Study of Education, Part II, Nelson B. Henry, ed. (Chicago: University of Chicago Press, 1958), pp. 147-165.

the talented, research projects, the development of course guides may be best provided for by general selection of staff members in various building units. Committees may be needed for such a variety of tasks as developing record procedures, testing pupil reactions, reporting to parents, and locating staff and community resources. Thus, meetings are inevitable and necessary to clarify working conditions, line and staff arrangements, request procedures, and other details of administration.

The most effective local working unit on curriculum matters is the individual school. Under a principal and in cooperation with the coordinator from the central office, the teachers in a single school can select objectives, plan steps, and adapt a program at a pace convenient to themselves. Inasmuch as there is likely to be good personal relationships as well as an opportunity for face to face communication, group identification with planning may be more effectively secured through first-hand participation. Additional advantages are the elicitation of highly prized grass-roots ideas, an increase in morale, more appropriate local adaptations, easier revision and organization, and greater feeling on the staff's part for freedom and pride in personal accomplishment.

The exact order of steps to be followed and the organizational patterns created for staff work certainly should depend on the situation. No one could honestly aspire to establish a set format for all school systems. However, the amount of valid production and change will depend on how the staff feels about the program. The entire staff will not need to participate directly, but they should be oriented as to the direction and purpose of the program since it will need total support.

Progress in any aspect of school programming depends upon some one or some group's having a definite mandate to stimulate others and to assume direct responsibility for the program. As one administrator put it, "In order to have a continuous and alert program, we need a gadfly. We need someone who has conviction and enthusiasm, who can transmit his ambition to others, who can arouse and maintain curiosity and interest." Assignment of a program consultant or coordinator for the gifted is a usual procedure in large systems. Another alternative is the designation of responsibility in the duties of general supervisors, resource personnel, and other instructional leaders. In a small school system it is probably inappropriate to designate a full-time administrator of activities for the gifted. Leadership must continue to rest with the principal or with some staff member who can be relieved part-time to collect basic literature, to supervise the review of records and the administration of appropriate tests, to provide and develop resources, and to encourage experimentation.⁷ Schools

⁷ Clifford W. Williams, "Organizing a School Program for the Gifted," *Education for the Gifted, Fifty-Seventh Yearbook of the National Society for the Study of Education, Part II*, N. B. Henry, ed. (Chicago: University of Chicago Press, 1958), pp. 400-401, for further duties of a coordinator.

often invite outside consultants to supply the directive force for ventures in curriculum improvement. Occasionally, these outsiders become rather permanent fixtures and contribute substantially to the vigor of the improvement activities by providing suggestions and challenges. But no school system can long depend on the analyst from the state university or the big city. It must find within its own staff someone or a cadre of people who have the ability to follow through on projects.

Of course, attention must be given to creating conditions and situations in which individual teachers may make direct contributions. The principal or general supervisor should be helpful in locating areas for development, in supplying the teacher with resources, and in promoting individual and small group conferences. The tasks to be undertaken by those who want or have to participate should be approved and supported only after thorough cooperative examination. The coordinator can easily set up report forms, request analyses of adaptations made, or insist on regular meetings of special teachers and of regular class teachers without full consideration of either the opinions or the interests of participants. When unexpected, even if important, tasks that are thrust upon teachers are more than likely to produce only a minimum of effort. More than they are willing to admit, coordinators and directors often do not have the support of either the regular or the special class teachers because they do not heed their protests with respect to burdensome expectations, too many meetings, and too few resources. In order for the staff to cooperate, there must be a time for sharing, reporting, and making decisions. But as with everything else, there can be just so much infringement on and interference with the teacher's responsibility to work out his own plans. His defense all too often is just to carry on outwardly until the enthusiasm in his leaders dissipates. Whatever the structure, emphasis should be on interaction and communication and a decided commitment to heed teacher observations and reactions.

Initiating a Program

Efforts in initiating a program need public support. A great deal of our present citizen dissatisfaction with the schools has arisen out of the failure of responsible school officers to explain to the public why changes have been made. To correct this situation, better communication from school to community and far greater involvement of citizens are needed. Consideration must be given to the role the community plays in designing and providing a program for the gifted. Some factors which exert a real influence in the way a program develops are the size, wealth, social structure, social values, and attitudes of the community. The degree of flexibility in programming is determined to a large extent by them.

The inception of a program for the gifted involves a series of steps de-

signed to establish a sound foundation. First, over-all direction must come from the educators. The administrative staff and teachers must outline the program and develop areas of common viewpoint. In the past, programs for the gifted have failed because the educators did not truly represent a unified viewpoint. Once this is accomplished, the blueprint is next presented to the board of education for dissemination of ideas and consultation. The board represents a common meeting ground between the community and educators, and when the issues have been resolved, the plan is then presented to the community by the board and the education staff. For orientation purposes time should be allowed for a study period at the local school level. Each subgroup should be permitted to ask for, receive, and exchange information. The community, too, should have an opportunity to modify some parts of the program. This interchange of ideas encourages the cohesiveness of a community and its educators. While the community is delving into various problems, the students, beyond the elementary school level, may be alerted as to what innovations will confront them. This gives them the chance to become more integrated as adults by having something done with them rather than for them. Lastly, the distributive communication agencies, newspapers, radio, and television representatives can be informed of current developments. Too often an error is made in giving information to these agencies before the community leaders have been consulted; the result may be sheer confusion. Including communication agencies will, however, help to disseminate information to everyone. This sequence of slowly integrating and inculcating each group with the fundamental concepts of the plan is based upon the necessity for involvement and understanding of each member of the community.

IDENTIFYING THE GIFTED

Defining the Gifted

The purpose of a definition is to describe accurately some phenomenon for communicative purposes. In the area of the gifted, some of the current descriptions, for example, remarkable performance, top ability, academic talent, and a host of others, are either too broad to be meaningful or so specific they overlook essential process factors. These criteria can be misleading and erroneous when they exclude significant variables. Such delineations present limitations because of the nebulous interpretations which ensue.

A definition in the behavioral sciences also poses serious obstacles. Human behavior is a complex pattern of interactive variables; it does not permit qualitative definitions of isolated and precise components. On the other hand, the use of a quantitative element exclusively to define a phenomenon disregards the comprehensiveness of behavior. Too much

cloudiness or overlap in description can only result in a dilemma. Wherever possible, the distinctive qualities of the phenomenon should be clearly outlined.

Before defining giftedness, it seems pertinent first to discuss some related issues. People differ in degree not kind. Consequently, the matter of degree becomes the unit for differentiation. We can assume that the wider the range between groups or individuals, the greater assurance of differences. Undoubtedly, we can safely predict within limits that a youngster with an I.Q. of 130 is closer to being a gifted individual than one with an I.Q. of 75. However, the predictive validity becomes less accurate as the range diminishes. For example, is an individual with an I.Q. of 140 more gifted than another with an I.Q. of 130 or 125? The answer is not simple and definitive. This, then, demands, when dealing with a restricted distribution, that in addition to a single quantitative score other factors must be considered in the cluster pattern to determine the possibility of giftedness.

Unfortunately, the most popular method for the designation of giftedness is the utilization of a single factor—the intelligence quotient. Getzels and Jackson clearly indicate a need for expanding the present concepts of giftedness. They decry the use of a single metric, the assumption that “. . . within the universe of intellectual functions themselves, we have behaved as if the intelligence test represented an adequate sampling of all these functions,” and “. . . there has been a failure to attend sufficiently to the difference between the definition of giftedness as given by the I.Q. and the variations in value placed upon giftedness as so defined.”* In their experiment, they compared two groups of children who were referred to as “highly intelligent,” and another group known as “highly creative.” Despite a 23 point I.Q. difference in their mean scores, both groups were equally superior in school achievement to the total population. More significantly, the “highly creative” group placed a lower value on marks, I.Q., character, and goal-directedness than the “highly intelligent” individuals, but rated wide range of interests, emotional stability, and sense of humor higher than the comparative group. One may conclude that determination of giftedness from an I.Q. score alone may eliminate many creative individuals who are potentially superior students. Some supporting data are shown in the thirty-five-year follow-up of the Terman group, all who were selected on the basis of I.Q. Not one of the group has become a great creative artist. This evidence suggests that the use of an I.Q. score as the sole factor in giftedness is limiting as to potential productivity.

Which factors need to be included in a concept of giftedness? The task, as previously illustrated, becomes extremely complex as one moves away from the neat quantitative score and delves into the qualitative aspects.

* Jack Getzels and Philip Jackson, “The Meaning of ‘Giftedness’—An Examination of an Expanding Concept,” *Phi Delta Kappan*, Vol. 40, November 1958, p. 75.

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Conceivably, the gifted individual will basically show a superior intellect, separately or in combination with, a talent in such areas as art, music, social leadership, mechanical ability, foreign languages, science, mathematics, dramatics, and creative writing. The contention that one can possess any of the stated talents without having a superior intellect is worth consideration. If the measured talent is of such superior development, it can be safely assumed that generally the individual is advanced in intelligence, except in rare instances. When a wide disagreement between high-order talent and measured intelligence occurs, with the former being greater, the intelligence test is not revealing the true capacity of the individual. The reasons for this disparity may vary from conscious underachievement on the test to emotional disturbance. In any case, the test is definitely underestimating the individual's ability. Lastly, the possession of superior talent and high intellect is meaningless unless the individual has the creative ability to employ his potential. The implication is that creativity may be a separate and distinct factor from a measured intelligence level and talent.

In conclusion, giftedness may be defined as a superior general intellectual potential and ability (approximate-I.Q. 120+); a high functional ability to achieve in various academic areas commensurate with general intellectual ability, a high-order talent in such special areas as art, music, mechanical ability, foreign languages, science, mathematics, dramatics, social leadership, and creative writing; and a creative ability to develop a novel event in the environment. This definition probably includes about 15 to 20 per cent of the school population.

Doubts About Identification

There is sufficient information to suggest that the present methods of identifying gifted children are inadequate. School systems are not wont to provide facilities to engage in an effective identification program. Partial techniques have been continued because of lack of time, money, or sheer ignorance of diagnostic procedures. Identification has been oversimplified with the result that many superior youngsters, who would ordinarily be detected as possessing talent and creative ability, escape notice.

We allow too many of our capable students to pass through our schools without any true measure of their potential superiority. As Witty points out:

Generally the neglect of the gifted pupil has been great in our schools. Today increasing numbers of educators acknowledge this neglect; and some are attempting to alter the situation.⁸

⁸ Paul Witty, "Who are the Gifted?" *Education for the Gifted*, Fifty-Seventh Yearbook of the National Society for the Study of Education, Part II. N. B. Henry, ed. (Chicago: University of Chicago Press, 1958), pp. 50-51.

Instruments and techniques now commonly employed to identify the gifted leave much to be desired. They have been criticized for being unreliable, for not revealing latent abilities, for being culturally biased, and for being generally inadequate in the special talent areas. Even the highly regarded tests of intelligence are subject to critical appraisal. As Wilson has commented:

. . . tests which are available measure or predict only *simple* mental processes and fail to supply sound measures of the more important kinds of mental functioning such as are involved in critical analyses, synthetic thinking and the various creative processes.¹⁰

Davis's work clearly shows that children who have been deprived of a cultural and educational enriching home environment are penalized by the present measures of identification.

Half the ability in this country goes down the drain because of the failure of intelligence tests to measure the real mental ability of the children from the lower socio-economic groups, and because of the failure to recognize and train this ability. . . . Recent research indicates that many slum children, who do poorly in school and on present intelligence tests, have higher real or native intelligence than many children from higher income families whose home training enables them to do well on school-types of learning.¹¹

The loss of this group becomes more meaningful when special programs are developed only for those superior children who are identified as gifted. Very often it is assumed that the low socio-economic group has few gifted children. This is not true. "Although the proportion of high I.Q. children is larger in the higher socio-economic levels, the great bulk of superior children is to be found in the much larger total membership of groups lower in the social scale."¹² Undoubtedly with better techniques for selecting the able students, this oversight would be immeasurably reduced.

Specific comment concerning the teacher is necessary since his judgment is most important in the initial selection, as well as in giving confirmatory evidence of superiority. Primarily, the teacher should identify the gifted. However, his adeptness is open to question:

One of the interesting facts learned in investigations of gifted children is that teachers sometimes fail to identify them accurately. Only 15.7 per

¹⁰ Robert Wilson, "Improving Criteria for Complex Mental Processes," *Improving the Quality and Scope of Measurement*, Arthur E. Traxler, Chairman (Princeton: Educational Testing Service, 1957), p. 13.

¹¹ Allison Davis, "Poor People Have Brains Too," *Phi Delta Kappan*, Vol. 30, April 1949, p. 294.

¹² Harold E. Jones, "The Environment and Mental Development," *Manual of Child Psychology*, 2nd ed., Leonard Carmichael, ed. (New York: John Wiley and Sons, Inc., 1954), p. 650.

cent of the children nominated by 6,000 teachers, each as the most intelligent in his class, were found to be qualified for the gifted group.¹³

In a more recent investigation, Pagnato and Birch¹⁴ attempted to discover which procedures or combination of procedures were most reliable in locating gifted children. They note rather significantly that teachers missed more than half of the gifted and that 31.4 per cent of the children selected as gifted were of average intelligence as measured by the Stanford-Binet. Obviously, the need to establish specific behavioral criteria of giftedness to help teachers improve their techniques of selection is critical.

The Identification Process

Identification is a process which attempts to screen and select bright individuals in order to plan a program for them. Most assuredly it is not an end in itself, but a means to develop a broad program suited to the youngster's needs, interests, and abilities. The function of identification is to discover all gifted children who evince superior ability.

Identification implies the assessment of different dimensions at diverse levels in various situations. Factors with which to be concerned are: intellect and creativity; social leadership; mechanical ability; creative writing ability; art, music, dramatic talent; foreign language ability; science and mathematics. Any identification measures must be varied enough to include all areas of behavior as well as talents. They must be administered continuously and systematically in order to identify late-bloomers and youngsters who may not have tested high on the initial screening. They should be subjective as well as objective in order to include not only test data but teacher and parent observations. They should be intensive enough to assess aspiration level, personality, attitudes, and interests which are essential factors in programming. Finally, they should start as early as pre-kindergarten entrance, thereby assuring the inclusion of as many gifted children as possible.

The people involved in identification include parents, teachers, and psychologists. The predictive level of selecting a gifted child by any one group varies considerably. Psychologists probably have the highest degree of validity and reliability since they deal more with objective data. This is not true of parents and teachers. Part of the problem in trying to achieve better reliability in selective criteria lies in the undue emphasis that teachers and

¹³ William H. Bristow, et al., "Identifying Gifted Children," *The Gifted Child*, Paul Witty, ed. (Boston: D. C. Heath and Co., 1951), p. 16.

¹⁴ Carl V. Pagnato, and Jack W. Birch, "Locating Gifted Children in Junior High Schools," *Exceptional Children*, Vol. 25, March 1959, pp. 300-304.

parents tend to place upon performance and conforming behavior. Very often the superior child who assumes the values and attitudes of his parents and teachers in his behavior is more easily selected as gifted, while the creative individual, who probably possesses negativistic attitudes and resists pressures placed upon him in school, may go undetected. Another hindrance is the lack of specific traits to guide teachers and parents. They must recognize the specific characteristics which exemplify giftedness. An objective checklist, with concrete descriptions to be used as a guide would be invaluable to enhance more adequate appraisal. Through more efficient definition of objective criteria, descriptive observations can be geared in a definite direction. In making a composite pattern, each can contribute to the other in verifying the elements of giftedness and consequently raise the level of validity and reliability.

Using a combination of methods for identification is considered good practice. No one technique for selection is infallible. Therefore, a variety of measures are needed to accumulate the global information necessary for interpretation. Usually standardized achievement tests, group intelligence tests, and individual intelligence tests are employed. For initial screening purposes a group intelligence test and standardized achievement tests may be sufficient. Where verification is desired, an individual intelligence test can be administered. Ideally, the individual intelligence test should be given to all gifted children because the nature of the data is so important, but at present, this procedure is financially impractical in most school systems. Undoubtedly, tests for creativity should be included in the battery for assessment. Talent tests, either teacher-made or standardized, provide additional resource information. To add to the combined information and to achieve an inclusive picture of the youngster, interest inventories, diaries, autobiographies, sociometric indices, personal history, personality measurement, and motivational assessment are important. Not only is the present level of ability important, but past performance where available in the form of developmental and school history, should also be included as supplementary reference points. Generally, broadening the scope of assessment devices will result in more adequate planning to meet the individual's needs.

ADMINISTRATIVE AND INSTRUCTIONAL PROVISIONS¹³

Central to the problem of administrative provisions is the archaic bugaboo of homogeneous versus heterogeneous ability grouping.

¹³ Modifications of sections on "Administrative Procedures and Acceleration" in JOHN A. FIEGLER'S "Some Problems in Educating the Superior Child in the High School," *Frontiers of Secondary Education*, Paul Halverson, ed. (Syracuse: Syracuse University Press, 1960).

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In practice, it seems farfetched to assume that any type of grouping will lend itself to absolute homogeneity. Variability is the essence of existence, and whether total or partial segregation is practiced, heterogeneity is the constant protean characteristic of life. At best, there is only relative homogeneity. Unfortunately the violent emotional reaction to homogeneity tends to obscure the basic error in such a classification and the real issue for grouping. The concern should be for the relevance and significance of grouping, and whether the outcomes will be purposeful to optimum achievement. This may be recognized as a plea to eliminate the term "homogeneity" from educationist jargon since it does not exist operationally as a behavioral concept.

Fundamentally, grouping procedures should be based upon a number of relevant assumptions

1. Grouping of some sort is a necessary function for social living in our society. The social ideals of a democratic citizenry can most practically be inculcated and cooperatively developed when students of different socio-economic and intellectual levels are grouped together in diverse, but not all, situations.

2. The purpose of grouping should be determined by the goals of education with specific recognition of individual differences

3. The aspirations of an individual can most feasibly be coped with in a flexible program designed for meeting his social, intellectual, emotional, and vocational needs. The grouping procedures should enhance intellectual and social learning, not serve as a deterrent for development of potentialities of the individual.

4. Learning should be economical in terms of the expenditure of combined efforts of the teacher and the student.

5. The development of critical thinking occurs best in an atmosphere of interstimulation between superior minds who can challenge, question, and evaluate each other.

6. The special talents of an individual can most profitably emerge in specific talent classes under the tutelage and guidance of a gifted teacher. This partial list of assumptions should be considered before any administrative structure is established. The effectiveness of administrative devices depends upon giving each of these assumptions equal weight.

Dynamic leadership demands a searching analysis of any administrative procedure to see whether the purposes of education are being fulfilled. Too often the procedure is selected and then a rationale is created for it. Such shoddy thinking impedes significant growth and reasoning. Comprehensive objectives and aims must first be established, and only then should an administrative framework be determined. Furthermore, constant evaluation is necessary to appraise the germaneness of the two and to meet the demands of a fluid society.

Forms of Administrative Adaptations

A number of grouping procedures are generally utilized with the superior student. *The relative merits of every available procedure will not be discussed because they have been consistently rehashed in the literature without reaching definitive conclusions as to the merits of any method over the others.* The selection of any grouping procedure at this stage reflects more the intent and purposes of the teaching personnel and the community than it does available research evidence.

The patterns for grouping seem to be illustrated by three major administrative divisions:

- (1) Total ability grouping in a special school or special classes in a comprehensive school, as illustrated by the track plan.
- (2) *Modified ability grouping.*
- (3) Talent sectioning for youngsters possessing high-order talent in various areas.

Each of these provisions is based upon some form of segregation. The assumption is made that a more stimulating academic environment resulting from segregation will tend to bring capacity and ability closer together. Yet, numerous issues surround this concept.

Segregation is a difficult policy to institute in a school system. As soon as segregation is conceived as a possible provision, emotionalism tends to be projected into the consideration. Too often segregation is viewed as a negative and harmful practice. The objection is conceivably toward isolation, *not* segregation. Little thought is given to the fact that segregation is a fundamental aspect of life. As soon as an individual is born, he is in the process of segregation, but he is simultaneously becoming integrated at a different level. Segregation and integration are basic aspects of growth, as exemplified in differentiation and unity, and are continuous functions of life.

There are numerous instances where segregation and integration are deemed fruitful for social living. Religion and politics are just two illustrations in which segregation is considered appropriate. These are not considered undemocratic but positive forces in life when they integrate or unite for worthwhile causes. In fact, the greatness of the United States, which preserves states' rights within a federated structure, is based upon the segregation and integration principle.

Segregation can lead to either integration or isolation. It depends upon the purposes of segregation and the manner in which it is carried out. The fault, if any exists, must rest with the educators who devise the pattern of operation. For example, no one would dispute the statement that a college is a segregated situation, but there the vast majority of our leaders are educated and most liberal ideas tend to flourish. Some educators contend

that segregation is plausible at the college level but impractical at the elementary or secondary school level because the student is not ready to accept intellectual and social segregation in his early years. This contention is open to question. The chronological age grouping, as currently practiced in our schools, represents a form of segregation which is considered essential for maximum growth. There is probably no best time to segregate since it is a functional part of education. The crux for creating integration or isolation is not the remoteness or proximity of people or of buildings but the content of ideas which are developed within the classroom.

The decision to segregate a group is based upon the principle of providing a broad base in general academic areas. The decision recognizes that the gifted child shows a generalized attribute of superiority, but that he is not equally superior in all areas. Grouping these youngsters together for all subjects, some in which they may not excel, places a burden upon the individual. Whether it is beneficial to expose a youngster to acute competition is a question that must be answered before embarking upon such a program. From a mental health viewpoint, the most highly segregated situation still requires latitude for relative mediocrity in some areas among the gifted.

Total Ability Grouping

Total ability grouping has similar import, whether it is practiced as the track plan within a comprehensive school or in a selective special school. In both instances, gifted children remain together for the entire school day. The need for grouping in each situation is still the same—a segregation that is primarily based on a general academic superiority.

The recent pressure to do something more for the gifted has brought special public schools in for considerable discussion. At least one highly outspoken layman¹⁶ has made a proposal that special academic and talent high schools be set up around the country and that the superior be discovered wherever they are and be sent to them, first at the expense of private philanthropy and presumably later at public expense. The reaction among many public school personnel who unabashedly admire comprehensive schools has been, to say the least, vigorously negative.

The usual secondary school program has, of course, nearly everywhere provided some arrangements for special interest and/or ability. The sequence and diploma requirements in high school have been widely accepted as dicta. As a result, a kind of natural selectivity in taking the more difficult courses has been operating successfully for a long time. These classes have had to be comparatively homogeneous, and the less able have simply failed or dropped out.

¹⁶ Hyman Rickover, *Education for Freedom* (New York: E. P. Dutton, 1959).

Specialized high schools for the more able have existed for some time. A number of private schools have nearly always restricted their enrollment to a select population and have been particularly careful to screen their applicants to assure a group capable of high scholarship. Private educators have not had much difficulty in supporting the select school idea. Among public educators however, there has been, in general, far less sentiment for creating special schools for the highly talented. Part of this lack of interest has been a natural product of the home rule situation in American education whereby each relatively small school district has had the power to create its own school. Because of the nature of most of these local districts and because of the size of the available student body, plus convictions of equality already noted, the comprehensive high school has become the common high school type. No state has seen fit to interfere with the pattern and create special area high schools.

By contrast in a number of large cities, although the comprehensive school has prevailed, the vocational and technical school has taken hold. New York City for many years has had schools with special focus of one order or another for the academically able and the talented. One of the most highly regarded is the Bronx High School of Science.

Those educators who have had the responsibility for a special public school offer a solid phalanx of support. Morris Meister,¹⁷ who served as principal of the Bronx High School of Science, says in its defense:

The upper segment of high school students find in the appropriate special school a realization of purpose which they cannot find in the general high school. They can do the work required in the general high school in much less time than it takes the other students. When this extra time is not wasted, it is rarely employed at levels which bring the maximum return. In the specialized high school this extra time is used to better advantage. For example, in a high school of science, the students are those who have demonstrated a more-than-passing interest in science, and who will later become physicists, doctors, engineers, chemists, biologists, psychologists, research workers, and the like. Science, to them, has a purpose not as easily found elsewhere. . . .

To achieve integration effectively for the adolescent, one must have a central purpose. Such a purpose exists for students in a specialized high school. The greater homogeneity of the student body with reference to dominating interest, level of ability, and terminal aim opens up opportunities, not otherwise obtainable, for bringing ideas together that belong together. Although syllabi may look the same for both types of schools, the teaching and the learning which result from them are distinctly different. One needs only to visit a classroom in English or social studies or physics in a specialized high school to be impressed by the extent and the quality of curriculum integration and by the superior performance of the students.

¹⁷ Morris Meister, "A High School of Science for Gifted Students," *The Gifted Child*, Paul Witty, ed. (Boston: D. C. Heath and Co., 1951), pp. 219 and 220.

Gertrude Hildreth, widely known for her active support of special education for the bright joins with Florence Brumbaugh and Frank Wilson¹⁸ in writing about the virtue of the special school at Hunter College:

Special attention to proper nurturing is the only hope of conserving the gifted child's high abilities for the ultimate benefit of society. . . . These children merit exceptional educational advantages throughout their school years.

Other claims are made that pupils are happier, their scholarship is on a higher level, more go on to college, competition is keener and more wholesome, teachers rise to new heights of competence, and at the same time altruism and humility are preserved, if not enhanced in the gifted.

The objections to special schools are similar to those proposed in opposition to ability grouping or the track system in comprehensive schools. Opponents argue that superior students will not have the opportunity to appreciate the wide range of human talents, and they will fail to learn how to resolve their problems cooperatively with peers having lesser intellectual powers. The fear of elitism is always present. Another argument is that it is too early to begin such concentration at the public school level. Selective instruments are not well developed enough to make an early identification valid. Furthermore, too much pressure and tension are created for the good mental health of those selected.

At least theoretically, an observed difference exists between the special school and special classes in the comprehensive school. In the special school, there is a kind of social segregation from intellectually normal and intellectually slow youngsters. No possibility exists for interchange between these students, whereas special classes as structured in the comprehensive school do allow for some interrelationship with other students. Proponents of the special school argue most eloquently that gifted students in the comprehensive high school still seek out other gifted students as their friends and tend to segregate themselves. Whether this is a result of the milieu or some intellectual and social homeostasis must be studied carefully.

The assignment of teachers is another issue which exists between the special school and the comprehensive school. Because of the advanced level of students in the special school, the master teacher tends to be chosen for this situation. On the surface, this practice seems to be appropriate. But in reality, the less adequate teacher selected for the comprehensive school may deprive the gifted youngsters in that setting of a creative environment. Another fact, often overlooked, is that the placing of a master teacher in a

¹⁸ Gertrude Hildreth, Florence Brumbaugh, and Frank Wilson, *Educating Gifted Children* (New York: Harper and Brothers, 1952), p. 9.

comprehensive school may upgrade the level of teaching for the school as his techniques are transmitted to his colleagues.

Modified Ability Grouping

The modified ability grouping procedure has been used extensively without any real recognition as to its value. The organizational pattern is established so that the superior youngsters participate with their intellectual peers in academic subjects for only part of the day and participate with their chronological age peers in peripheral subject areas for the remainder of the day. The time spent in the special class may vary with the situation, one-half of the day being considered optimum.

One distinction between the total and modified ability grouping is quantitative and depends upon the extent of time the gifted youngsters are segregated. In the former, the superior group functions as a cohesive group for the entire day, while in the latter they remain together for a portion of the day. Another difference between the two is qualitative because the modified program is construed as being more democratic and psychologically more sound. Fundamentally, it permits: (1) A greater interchange between students of different intellectual abilities in peripheral subjects, e.g. art, music, and physical education, thereby allowing broader social interrelationships and extending democratic attitudes; (2) Flexibility in programming which allows the gifted to shift between groups in order to achieve maximum intellectual and social stimulation. The difficulties of modified ability grouping center about teacher load, number of students, and the ability of the gifted student to transfer from one group to another.

Teacher load has always been a problem, but it becomes more crucial in the modified program. A teacher may be responsible for teaching the special class for the gifted as well as the regular class which includes the gifted as well as the slower student. Under the usual instructional programs within chronological age grouping, it is sound educational procedure to plan for individual differences. However, in practice, the tendency is to level teaching toward the middle. With the division between groups in the modified program, circumvention is not possible. The gifted group must be worked with directly since they are grouped together. They cannot be diverted through individual busy reading, repetitive work, or tutoring other students. In addition, instructional and resource materials must be available for the slow and average student. This problem is not so difficult at the secondary school level where departmentalization has been the accepted practice, but at the elementary school level it is a hardship. To avoid the problem of shifting between groups, the teacher may be assigned two superior groups of different grade levels throughout the day. Here again the

task becomes burdensome. As a means to assist the teacher, the employment of a resource consultant is advisable. The resource consultant can increase teacher efficiency through the development of resource units and aids and the demonstration of modern methodology.

To operate the modified program efficiently, a large number of bright students must be available for the organization of special classes. Since the enrollment in the elementary school is generally less than the secondary school, the problem is more pronounced in the lower grades. To offset this disadvantage cross-grouping can be established. Cross-grouping, in this sense, refers to combining gifted students of different grade levels to increase the class size. One word of caution: Integrating more than two grade levels in one cross-group may be harmful from a social and intellectual developmental point of view.

Transferring between intellectual and chronological peer groups may be beneficial or troublesome because of the increased number of interrelationships. The student must learn how to cooperate and function with a variety of individuals and to increase his field of social perceptions and interpersonal techniques. The intellectual and psychological shifting provides an excellent opportunity to enhance personality development. However, this is not true for children who are incapable of coping with these demands owing to emotional disturbance or a low aspiration level. It is wise to exclude these children from the program.

Talent Sectioning

Talent sectioning is an extremely popular method. It has become the most widely used procedure because of ease of application. The technique simply groups talented children together according to a subject area. The problems concomitant with total or modified ability grouping are not manifest here. Teacher load, administrative difficulties, and class size are not major issues. Philosophically, there is little or no concern for educating an élite since the gifted child spends comparatively very little time in the talent section.

Talent sectioning may be assessed in two ways: as an appendage to a regular course sequence; and as an integral part of a total program. Talent grouping is usually an ancillary part of the school program. In essence, classes are established for those who are talented in creative writing, foreign languages, art, music, dramatics, science, and mathematics, in addition to their regular program. Unfortunately, many educators assume this approach represents a program for the gifted. Such reasoning is fallacious because no attempt is made to develop the other superior qualities of the youngster. Too much stress is placed upon a talent rather than upon a

broad base of learning. The result may be an unbalanced interest in one subject.

Talent sectioning, as an integral part of a unified program for the gifted, is far more psychologically feasible. It takes into consideration the diverse qualities of individual differences in student and teacher abilities. It should be integrated with total or modified ability grouping rather than exist by itself. The purpose is to build on an academic sequence that is concerned with the general superior characteristics of the gifted as well as the high-order talents. Most significantly, general and specific learning are part of the same process. Learning is not segmented but is embodied into a comprehensive whole.

Acceleration

By definition, acceleration endeavors to expedite the learning process and reduce the period of formal education. It has assumed varied forms in actual practice. The four major forms of acceleration are:

1. *Grade-skipping* permits the accelerant to bypass the immediate higher grade level. It has been most commonly used in the elementary school.

2. *Rapid-progress* allows the individual to complete the regular academic program by compressing two years into one, or lengthening the school year, or taking extra courses during the academic year.

3. *Early admission* to public school permits the student to enter kindergarten or first grade before his chronological age group. The selection process for early admission adheres to a set of criteria which generally include intelligence, academic performance, social and emotional maturity, and parental attitudes.

4. *Advanced placement* is a means whereby a high school student can gain college credit and/or advanced placement. Advanced standing is obtained by taking college level courses and/or an examination.

Not all forms of acceleration can be indiscriminately instituted with the same degree of facility. Grade-skipping and early admission to public school require relatively simple adjustment in the classroom by the teacher. Assumedly, if the youngster is selected for acceleration, he can fit into the present mode of classroom operations. On the other hand, rapid-progress and advanced placement necessitate major changes in instructional practices and curriculum content. The compression of course material and advancement of ideas require extensive preparation and study. Before deciding to start upon an accelerated program, acceptance by the staff is necessary. Consideration must also be extended to the quality of teaching personnel, the school system's stage of curriculum development, community sensitivity, and parental attitudes.

Why is acceleration a worthwhile educational adaptation? Basically, it

attempts to advance a superior pupil academically in order that his total felt needs are met. It is designed to cope with the youngster's accelerated intellectual ability, educational achievement, and social maturational patterns by placing him in a strategic setting where he will be challenged more effectively. Through acceleration, the gifted child can take advantage of his early creative years and assist in closing the gap in the current imbalance of creative quality people. Increased motivation is an interesting by-product since the bright individual is not held to the standards more appropriate for the average child.

Strangely enough, although acceleration is a feasible administrative procedure, resistance to it is still great in spite of the research evidence. A review of the many studies on acceleration shows that the recapitulated data are weighted on the positive side. Shannon, in a critical review, concludes:

At this point we have seen that research has upheld acceleration on at least two points:

1. If properly used, acceleration of gifted children does not handicap them personally or socially.
2. Children who have been accelerated can maintain the quality of work done by their older classmates or even do better scholastic work at the high-school and junior high level.¹⁹

Notwithstanding these conclusions, acceleration should be applied in some cases with caution and should be individually determined. Although the advantages of acceleration far outweigh the disadvantages, uncritical application may be deleterious where the whole child is not considered. Not all gifted youngsters are ready for acceleration and capable of withstanding the pressures which may ensue. Emotional disturbance and aspiration level are two personal criteria which limit possibilities for acceleration.

Principally, unwillingness to accelerate a child is based upon two points:

(1) The desire to keep the youngster with his chronological age group. The reluctance to accelerate superior students stems from the proponents of social promotion who advocate that youngsters of similar chronological age should remain together as a group. Essentially social promotion is a misnomer because individuals may be of similar chronological age and not necessarily constitute a social group. It should be more aptly termed "chronological age promotion." Although chronological age may be a practical divisive method, flexibility in grouping is necessary to cope with individual differences. Numerous studies suggest that positive interaction between individuals to achieve group cohesiveness is an involved problem and depends upon many variables. Differences in maturation, interests, socio-economic level, life style goals, intelligence, and personality factors

¹⁹ Dan C. Shannon, "What Research Says About Acceleration," *Phi Delta Kappan*, Vol. 39, November 1957, p. 71.

deny the practicality of forming a group based merely on chronological age.

(2) The youngster may miss some important work in the development of skills. On the surface, this appears to be a most plausible argument. However, skill development is not restricted to a specific grade, but it depends upon the maturational level of the youngster. Where the gifted child is being held to grade level standards, not his achievement age, his progress is limited. The omission of skills, if it does occur, is primarily due to poor teaching techniques and has little to do with acceleration. But if the teacher is providing experiences commensurate with the youngster's ability, he should be learning skills far beyond his chronological age group because he is operating beyond grade level. Therefore, acceleration would be in keeping with the gifted child's superior developmental and learning rate.

Acceleration has another connotation other than the number of years to be spent in school. This is acceleration in terms of learning. At a glance, the interrelationship of both concepts can be immediately recognized. As soon as you accelerate in grades, inevitably there is acceleration of learning. The converse, though, is not true. Acceleration of learning does not imply acceleration of grade level. Under the most suitable conditions, acceleration in learning can best be accomplished through telescoping in a special class arrangement. Its advantage lies in the amplification of learning experiences.

The Concept of Enrichment

Enrichment is a most overused and abused concept. The lack of clear definition tends to confuse its real meaning. In some instances, it refers to special class arrangement, special resources, or extra-class activity. At other times it is restricted to different and additional activities in the regular class as contrasted to segregation. Semantically, it seems strange to use enrichment as a different kind of activity or adaptation. The implication is that this provision is something extra or unusual which under appropriate circumstances would not be given to the gifted. It assumes that enrichment is the creation of opportunities beyond the regular school program. This is obviously incorrect. There is nothing that is special which should not be ordinarily employed in an adequate instructional program.

Basically, enrichment consists of the selection and organization of learning experiences appropriate to the youths' adequate development. It is not, therefore, "special education" in the meaning in which the term is generally used—giving attention to students with unusual problems—but rather the essence of all good education.²⁰

²⁰ A. Harry Passow, "Enrichment of Education for the Gifted," *Education for the Gifted*, Fifty-Seventh Yearbook of the National Society for the Study of Education, Part II, N. B. Henry, ed. (Chicago: University of Chicago Press, 1958), p. 193.

Furthermore, the almost exclusive use of enrichment in the area of the gifted tends to distort its significance. Enrichment is not solely an activity or an administrative device; it is a learning concept in which certain experiences and methods are used to insure maximum development

Simply stated, enrichment means more opportunities for the gifted child to go deeper and to range more widely than the average child in his intellectual, social, and artistic experience.²¹

It is a process which increases the efficiency of organization and curriculum content. It presumes a variation in instructional grouping, methodology, and resources which should occur in the regular class as well as the special class.

This delimitation of enrichment is to demonstrate the direction it should take and to reduce the concomitant confusion. The inference is also made that something more needs to be done beyond enrichment if a good program is to evolve. No doubt, enrichment is the core of instructing the gifted, or for that matter any group of children. But this is not enough, if individual differences are to be taken into consideration and the gifted child is to fulfill his potentialities. Succinctly, administrative adaptations and a differential curriculum must be developed to amplify educational opportunities.

SUMMARY

The essence of this chapter has been to delineate the magnitude of problems which confront educators of the gifted. The controversies which ensue from the numerous program developments are not easily compartmentalized into neat dichotomous areas of right and wrong. The resulting confusions brought on by hastily conceived measures seem perpetual and sometimes inextricable, and sound and critical thinking seems unable to emerge. To improve this situation, the need for cautious deliberation in developing new direction and concepts is most essential. Interchange of ideas in a democratic atmosphere is a necessity in order to create a forward-looking education. Out of this may grow a unity and purpose and a higher order of quality in education.

Adequate development of our most capable children requires that attention be centered on determining and organizing an effective program. This program should include better means for identification, grouping, acceleration, and enrichment. Most significantly, planning should encompass a broad program commensurate with the gifted child's superior development

²¹ Robert F. DeHaan and Robert J. Havighurst, *Educating Gifted Children* (Chicago: University of Chicago Press, 1957), p. 97.

and a well-delineated talent program for his special abilities. Regardless of the administrative and instructional provisions which are instituted, new curriculum dimensions are needed. An effective curriculum, providing depth and balance in experience, can lead the gifted to a more positive and creative attitude toward life.

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CHAPTER TWO

Social Studies

HIEOWIG O. FREGLER

Unquestionably in this competitive scientific world the United States needs scientists. It is, perhaps, even a question of survival. On the other hand, equally important is to have our brilliant minds turn to the science of human relations, the study of man's relationship with man and his struggle with or progress over his environment. In this shrinking world man risks exterminating himself with his own inventions owing to a lack of understanding of his fellow man. Social studies, therefore, is necessary for gifted children because of its innate potential as one of the disciplines and because of the valuable social outcomes that will accrue to society itself.

In considering the social studies program for gifted children, we must distinguish between the development of the mental powers of the gifted child and his responsibility in a society as a person of ability. Both are important aspects of his development, and they are closely interwoven in the child's living. The mentality of the child will be best developed by those subjects that will cause his intellect

to grow. His social attitudes will be more adequately formed by those activities in which he participates as a member of a social group. He brings to both the activity and the group his superior intellect, and society profits, thereby, only as these two have been developed each to their highest potential.

The major problem today is what programs to offer and how best to provide for those children who have been identified as superior. Though they can be readily identified, it is difficult to provide the academic material that their intellect needs. Because such advanced program areas have not been crystallized, the reasoning ability of the gifted child is developed in a very haphazard manner as subject or teacher may allow. Social studies with the suggestions herein outlined and with the manifold possibilities that the alert teacher finds in them offers a wider span of potential development than any other subject with the possible exception of English.

The most outstanding and most easily detected superior accomplishment is the gifted child's power to manipulate ideas. He is able to discuss social problems, those of the past as well as the present, to explain situations that led up to them, to suppose possible causes, and to suggest probable results. However, the child who talks a great deal is not always a mentally gifted child; he may be trying to compensate for his inability to keep up with the ideas presented and for this reason presents the same idea in many different ways. At such moments the mentally gifted child may be distinguished by his silence. When he does speak, he elaborates adequately and expresses his ideas in social situations with precision. He seldom says, "I know what I mean but I can't say it."

Given the proper training, the mentally gifted child is capable of reflecting by looking back and studying the situations of the past. He is able to see their relationships to the present and their various possible outcomes in the future. This is essential for the social scientist. The gifted child can easily distinguish the essential from the nonessential and factual material from that which is illustrative in history. He quickly makes analogies to situations that exist today. Since he is logical in his thinking, he can easily understand and use inductive and deductive reasoning to prove his point. His ability to create makes it possible for him to project into the future the results of man's activities today.

Since these are his assets, then we must consider what is inherent in the social studies that will offer the challenge to the development of these assets and by what techniques the social studies teacher can provide suitable situations whereby the mentally gifted child can exercise his potential.

The social studies program described in this chapter for mentally gifted children has a two-fold purpose. As one of the disciplines, social studies should develop the child's mental ability. Through social activities the child

should develop attitudes toward his chronological peers which will determine his responsibility to society. For purposes of discussion they are considered separately in this chapter.

THE SOCIAL STUDIES AS A DISCIPLINE

The intent here is not to explain the place of the social studies in the curriculum; rather it is to point out the place of the social studies in the development of the mentality of the gifted child and in turn the advantages that will accrue to society from the fact that he has been given this specific training. No subject will of itself stimulate children to think. The mere memorization of facts can be accomplished by some very bright people with little profit to anyone. For example, there is the magician who memorizes long lists of things in chronological order, numbers them and when a number is called can give you the article so listed. Also there is the historian who can assimilate facts or do much research work and then fails to relate the facts he has found to some principle or even current problems.

Geography is the relationship between man and his physical environment. Both are closely interrelated by cause and effect and the chain reaction that is produced. History is the story of man's relationships with man in the past. Social studies includes geography and history plus man's relationship with man in the present. The social scientist needs to comprehend all of these various relationships and be able to project into the future possible outcomes from present and future action. This, because of his unique ability, is the contribution the gifted child can make to society.

The fact that social studies deals with relationships makes it an excellent subject for the expansion of the minds of these children. Relationships imply contacts with possible outcomes. These, in turn, give an opportunity for wise choices, the development of standards, and knowledge based on vicarious and actual experience.

While the student studies the past, he can be made aware of causal explanations for the interrelationships of situations that exist today. It is wise for him to develop the habit of seeking the causes and projecting into the future all possible effects of these causes on the basis of past experiences of society. He must learn to gather pertinent facts in relation to an existing situation and to foresee possible conclusions. He must be able to assemble the data and persuade others to accept his findings and his proposals.

The factual knowledge or material to be covered at any age level is often governed by the course of study prescribed by school boards, state laws, and college prerequisites. For this reason the course of study may be identical for all children. Such a limitation is inhibitory for creative think-

ing. Each child must assimilate up to his capacity and interest. The mentally gifted child should be offered an opportunity to explore the "why's" and "how's" and be encouraged to surmise the "therefore's," in other words, to know the facts in common with the group, to see the reasons or conditions which led to the situations, and then to project into the future the possible outcomes. Yet this, in itself, is not sufficient because the gifted child must learn to transpose the facts to new situations and produce a change for better living.

The subject-matter in social studies, however, is vast, flexible, and changeable because it is the evolution of ideas, which stem from man himself. The child who is interested can use the course of study as a springboard in his search for further knowledge. His proclivities may lead him to a broad area of interests or to narrow, intense, specific information on one subject. For either of these he needs inspiration, available material, direction, and encouragement.

Four important phases of the education of the gifted child in the social studies center around the techniques or methods whereby he learns: how to acquire knowledge; how to evaluate critically; how best to transmit knowledge to others; and how to develop his creative ability.

THE ACQUISITION OF KNOWLEDGE

Many gifted children seem to absorb knowledge without any observable effort or direction. Because of this erroneous assumption, too frequently the acquisition of knowledge is left to chance. The mentally gifted are endowed with an inquisitive mind, and the first steps of getting knowledge come naturally to them. "Why?" "How do you know?" "Let me see!" "Tell me!" "Read to me!" These are indices of natural ebullience, but they may obscure the need for developing adequate work habits, critical thinking, and techniques for evaluation. The acquisition of knowledge must not be a haphazard procedure, the gifted do need specific direction. Definite steps must be outlined in the development of this crucial skill.

Pictures are one of the first means of getting information or knowledge beyond the child's actual experience. At a very early age, adult books, particularly those with pictures, fascinate children. They will spend hours looking at *National Geographic*, *Life*, and other good pictorial magazines, which should be made available to them.

Since gifted children have the ability to interpret the printed symbol and can remember more at an early age, they can be introduced to research in social studies at first-grade level. Not all gifted children learn to read before they go to school, nor will they all begin to read at the same time after they are in school. Since their interest level is often more ad-

vanced than their ability to read, as soon as one of them is able to do so, he should read the material and the others can learn by listening. Before long all will be anxious to read to the group, and committee work for research in its simplest form is begun.

The committee for research is at first a planning group for dividing tasks so that more knowledge about the history of things can be acquired without the individual research that would be laborious for those children who are learning but have not yet mastered the skills of research. The committee plans and distributes the assignment among its members, and shares what it finds. At this point appropriate reading material is essential. Pictures and maps are still important, but the child has need for the printed word to give him additional information. Rather than the simplified reading that average children can use, he needs short topics of more mature content. He can soon read and enjoy short news items, particularly those with which he is already somewhat familiar. As the children mature, the committee becomes a group with which to share ideas and exchange opinions.

At all grade levels, the committee method provides the gifted child with an excellent opportunity to work with his intellectual peers. If the committee method is to be used for the purpose of acquiring knowledge, the children should be able to select the group with which they would like to work and the chairman should be chosen from among them. When given the choice, gifted children tend to choose those of more nearly equal ability with whom to work. This results in a natural kind of grouping which is lost when the teacher selects the gifted children in the class as chairmen to serve on different committees. The reaction of mind on mind is stimulating to these children in their quest for knowledge. The ability to benefit through committee work increases as the children grow in experience and mature in reasoning.

The need for more reading material than that which is offered in the social studies text becomes greater as gifted children progress through the grades. Because they must of necessity cover much ground, the texts omit many details that are very interesting. Thus the texts only whet their appetites for more information. All too often sufficient reference material is not available. Though children who live in urban areas can probably go to the library to get the information that they need, it is helpful to have reference books, encyclopedias, histories, and advanced texts, even college texts, covering the same and additional subject matter immediately available in the classroom. This does not eliminate the need for a library as a supplementary source; there is no substitute for the facilities and resources of a good library.

Lucky the child who has a well-planned and coordinated reading program for his social studies. Though he is probably already an avid reader, he needs direction and guidance. Too often the mentally gifted child is

forced to perform the routine class work that all children must do regardless of ability. Even though he has read history or geography materials much in advance of his grade level, he is still required to read the same chapters, participate in the same discussion, prove by test that he has assimilated the same facts. True, he can share with the class his knowledge of the subject that he has acquired independently. This is an important step in his development and one in which he needs training. However, sharing in this manner should not be regarded as in any way increasing his knowledge of the subject.

Techniques of research are necessary tools in the quest for knowledge and can be taught the gifted child as soon as he learns to read for information. Some time in the first two grades he is able to use the dictionary, the encyclopedia, and other reference books. He should be taken to the library, taught about its services, and shown how to use it. He should be taught to read one author and to report that author's opinion to the class or committee. In the third grade he should continue to practice research skills and be able to get information from two or three authors and either compare their opinions or summarize them. In the fourth grade, in addition to learning how to find information through card files and Readers' Guide to periodicals, he can be introduced to index cards on which to take notes and can learn to file them. Furthermore, he should learn to use his notes to prove a point. In the fifth and sixth grades he can use the cards to write a report and to give credit to authors for their statements. Oral reports should be a summary of the written report and an evaluation of the research done. Though these children do not need drill as we often think of it, they do need sufficient experience in using the tools of learning and the mental skills that they possess. In high school these children can practice the skills of research that they have learned. By the time they reach college these skills should be firmly fixed, and consequently, the research should be more mature and the results more comprehensive.

Keeping the superior student busy in a heterogeneous class has always been a problem for the teacher. "I know you will be interested in looking that up for us" is a favorite assignment for the top student. Then he is left on his own. Such "enrichment" too often becomes another research project without the proper skills with which to do the research or it may become another form of busy work because it lacks the challenge of other stimulating minds that produces growth. The superior student cannot always work with other superior minds, but he can be shown how to do the necessary research.

Much knowledge can be acquired through listening to the spoken word. The superior child is most likely to attend lectures and listen to informative talks on television and radio. Therefore, he needs to be made aware of the value of listening in order to learn and to be taught the specific skills that

are needed to listen efficiently and effectively. Such training is accomplished where radio and television are being used as teaching devices to bring into the classroom material that would otherwise be unobtainable. In today's world, learning to listen is as important as learning to read. And, in social studies, particularly that part of it which has to do with current issues, events are broadcast on radio and television sooner than they can be printed in the newspaper or other periodicals.

Even in the first grade, the gifted child is interested in what is happening today. At this time his interest is likely to be in the weather report. It is something with which he is familiar. The rest of the class is learning to read the thermometer and observe the weather conditions first hand. He can supplement this by weather forecasts as given on the radio or television. From this it is an easy step to urge him to listen for the news of the day. No other experience gives the mentally gifted child a more excellent opportunity to select, to reject, to analyze and to evaluate material. It offers him the chance to learn to distinguish between objective facts and propaganda. By the study of broadcasts he can be led to see the power of mass communication; its power of penetration and its accessibility. He must become aware of the influence for evil as well as good of mass media yet be prepared to defend the right of free speech. Therefore, his training in the evaluation and acquisition of knowledge through radio and television must begin early.

Various techniques can be used to introduce the art of listening as a means to acquire knowledge. In a class made up entirely of gifted children, they can listen to broadcasts, and then each child can give in his own words and in one sentence the news item that interested him most. This sentence he can later write, perhaps with the teacher's help, and it can be mounted on the bulletin board under the title "News of the Day." As the children are able to do so, they can add information when the subject is mentioned during a news discussion period. In a year or two the children may be avidly discussing one or two major news topics.

Because of its close relationship, the newspaper can be introduced to these children in a similar manner. They can cut out headlines and bring them in to class. The terms local, national, and international can be defined and the headlines classified accordingly. The next step is to evaluate the news according to immediate interest or future importance.

Discussing the news is a far cry from the weekly report of each child on a topic or a current event of his choice that was at one time thought sufficient for his understanding of the news. A genuine discussion of the news leads to inductive thinking. A group of twelve year olds became involved in a discussion of the many near accidents by planes. Comment followed comment as to place, time, reason. Finally one child said, "This all only indicates that there needs to be more stringent control of air traffic and

air ways or people will become afraid to fly and air travel will suffer." Without further comment the group moved to another news item.

Analytical thinking can be brought about by an evaluation of the relative importance of news. A report of the illness of an official in the government may seem of little significance at the time of its announcement, but when the political, national, or international policies of that person are considered and what the removal of his personality and leadership might bring about to the national or world situation, the evaluation changes. Teaching children to think along such lines in the present is even more important than allowing them to suppose what might have happened had history taken a different turn than it did. This is a favorite assignment of teachers. The same kind of thinking probably takes place, but projecting into the future deals with a situation in which the student can eventually act or which he can influence.

Knowledge can also be acquired by going to the primary source. Excursions for first-hand information have their place in the curriculum for gifted children. This is not the place to discuss the procedures for setting up excursions. It is mentioned here because it has been successfully used by these children to get otherwise unavailable information.

A teacher of seventh-grade gifted children employs the excursion in a rather unusual way. While the teacher and the rest of the class go on with some classroom work, a committee of children goes out to get the information which it plans to share with the class. Before this committee leaves the classroom, careful analysis is given to the need for the excursion; the manner in which to approach the people or the company they plan to visit; how to conduct themselves while they are there; what information they are seeking and how best to collect it. The children understand that they are taking the time of busy people during this visit. Class planning is an integral part of the excursion, and the members of the class feel that they are represented on this committee.

A similar scheme was tried at Genesco, New York, during a summer workshop for gifted children. There the entire class was divided into committees, and each went to different places for consultation, direction, experimentation, guidance, or reference reading. The children in the workshop were high school students working on a college campus under a co-operative plan which included the department heads of the various sciences. But, with careful guidance, this also would be possible for the social studies classes in a regular high school. Planning for excursions starts in the elementary school. More and more responsibility for planning the trip should rest on the student as he progresses. Adults often need to resort to primary sources in their graduate work or in their research. It is an essential skill for gifted children.

CRITICAL EVALUATION

As carefully as a boat must be steered between Scylla and Charybdis, so must the child be guided between blind acceptance and skeptical questioning of that which is written or spoken. At the one extreme the child may be duped by complete gullibility and on the other he may become overcritical. *The gifted child is less likely to become too credulous than he is likely to become skeptical.* Only when he is overenthusiastic about a subject is he apt to allow himself to be persuaded in this manner. The danger lies in becoming overcritical and skeptical of all statements.

Growth in critical evaluation is as essential as learning any other skill. Started at an early age it, too, should become a continuous process of development. In this way it provides a natural approach to all subject-matter. It will become an unobtrusive way of thinking. Periodically, standards of evaluation need to be reviewed and adjusted to the maturity of the group. Since gifted children may be inclined to be opinionated, they must learn that personal opinion must be based on criteria that have been weighed and evaluated in the light of past knowledge, lest it be biased or false.

Teachers have always made some attempt to teach children to evaluate. Frequently, they have not gone far enough in helping them analyze what they are to do in order to think critically. To say that a subject is interesting and well presented too often seems to suffice.

In social studies, it would be of value if teachers were to analyze with the children the meaning of the two terms "interesting" and "well given." Even younger children can use some of these criteria which stimulate thinking or at least indicate that some evaluating has been done:

1. The subject presented something we didn't know before.
2. The subject added to information we already had.
3. The subject was in direct opposition to some of the things we had learned before. Which is correct?
4. Was anything omitted from the report of the subject?
5. The subject was controversial. Many opinions differed.
6. The subject was timely.
7. The subject made us think about something entirely new to us. (Patriotism, principles, ideologies, philosophy, and the like.)
8. Who is the author of the statement? What gives him the authority to make such a statement?
9. *Is this your personal opinion? If so, on what is it based?*

Somewhat easier for younger children is the evaluation of the presentation:

1. The speaker knew his subject well.
2. The speaker used well-chosen, appropriate words.
3. The speaker could be understood by all.

4. The speaker "stood up straight"—later this can change to—drew little attention to himself.
5. The speaker proved his point.
6. The speaker convinced others.
7. The speaker used his illustrative material well.

These criteria are examples which can help the student do critical evaluation. They are neither in order of complexity nor are they complete. Not all of them will be used at one time. Each group of children will suggest those that are applicable to them and which meet their needs at the time. This will depend on their level of ability, their maturity, and the subject that they are studying. Critical evaluation is a skill that requires continuous practice, repeated challenge, as well as constant guidance. To be able to evaluate becomes of increasing importance to the gifted person as he pursues graduate study or does research on his own.

Self-evaluation is equally essential. Teachers who wear themselves out doing all the marking, grading, and evaluating are robbing the children of experiences that provide emotional growth. To look at oneself critically and accept the fact that an error was made or that the production was not as good as was anticipated is a difficult growing up process, but it is especially vital for the mentally gifted child who will one day need to direct his own activities rather than work for someone who will command or correct. Self-evaluation should precede the group's evaluation so that the child can test his insight and see if his standards for himself were too high or too low. If he can see his own errors, he need not be told about them. The question put to the child can be simple, "If you were to do this over, what would you do to improve your material or your presentation?" Mock modesty needs to be discouraged in favor of honest evaluation. Egotism will soon be detected and leveled off by the group's criticism.

Constructive criticism can improve the evaluative powers of the gifted child. He can improve if he feels within himself greater possibilities and resources not yet tapped. He can take criticism best in the presence of other gifted children. If he is singled out for criticism in a heterogeneous group, he sees himself through their eyes and feels humiliated, particularly if such criticism continues. It is a false premise that different standards of accomplishment for different levels of intelligence in heterogeneous classes do no damage. Unfortunately, the damage is not always immediately apparent. Wherever possible, grouping for such evaluation, even as we group for reading, might be a solution. Better still in social studies if these children were grouped among their mental peers. This is not only feasible but essential if the mentally gifted are to be developed to their highest potential.

COMMUNICATION

The acquisition of knowledge is the first step toward mental development. The assimilation of facts, however, should not be an end in itself. Critical evaluation, no matter how well done and by what rigid standards, is of little value unless it meets the challenge of other minds. A thought dormant in the mind is lost. Communication is the key that unlocks the mind and puts it in the service of society.

The gifted child is able to express his ideas orally at a much earlier age than he is able to do so in written form. Unlike other children, he is impatient with his inability to write quickly enough to put his thoughts on paper. For this reason he should be taught to type almost as soon as he learns to write. This should not take the place of writing and the need for writing legibly, but rather typing supplements writing and gives him a skill that he can rely on later.

Social studies offers excellent opportunities in expository writing. Mentally gifted children should write a summary, a paragraph, a précis, or an explanation of a new idea, as might be found in a news report, for example, almost daily in connection with their social studies. They should start with a sentence in the first grade and gradually increase the content until the essay comes naturally to them.

Special interest reports can be used to develop expository writing and also to provide an opportunity to follow a personal interest. In the primary grades more will be accomplished on the basis of group interests, but at least once a year the gifted can report on their special interest, which is most often an individual affair. Interests started here have continued through the intermediate grades and even into college. These reports provide needed experience in the organization of ideas and in presentation in both oral and written form. The evaluation and comment given by the class help the child determine whether he should continue his subject or if he has reached the saturation point of his interest.

Gifted children are very vocal and like to talk. In their eagerness to tell all that they know, they are inclined to monopolize the conversation. They have much to relate and are eager to say it. They need to learn to respect the opinion of others and to give and take in conversation. Social studies provides ample material with which they can learn to express themselves under guidance. Techniques for sharing and exchanging ideas offer the opportunity to develop their ability to communicate.

Discussion

In order to provide children with sufficient experience in oral communication through social studies, the teacher needs to have at his finger

Because the discussion does not take place until a few days after the selection, the class in the meantime becomes as well informed as possible on the subjects selected. No leaders are chosen until after the class is divided and the discussion is about to begin. As each question comes to a group, the children decide who among them is best qualified to lead on that particular question. This implies that the class has had other discussion periods so that the participants know each other well enough to make this decision. The discussion begins and lasts the announced time limit. When the bell rings, the question is passed on to the next group. This continues until the questions have reached all groups. After this the scribes report to the group, and the evaluation again takes place.

Up to this point discussion as a method has developed progressively from the simple to the more complex. It can continue to become even more effective if the teacher is ingenious and devises other ways to use it. The possibilities offered by grouping gifted children for discussions are unlimited.

Having learned the technique, the group can use discussions for a wide variety of purposes. The technique can be applied to panel discussions or individual talks. It is basic training for the seminar approach where students share, evaluate, and refine ideas gained through research.

Criteria for an Effective Discussion

Three units are involved in a discussion: the subject, the leader, and the group. All three must serve their purpose or the discussion will fail.

1. The subject:
 - a. Is well chosen. It has been delimited, yet is broad enough for several points of view.
 - b. Is of interest to the group. This can best be determined if the question is selected by majority vote from a list compiled by the group.
 - c. May be one of interest to one or more members who wish to present it for evaluation.
2. The leader:
 - a. Knows his subject.
 - (1) Presents a short introduction.
 - (2) Has many questions ready to stimulate thinking
 - (3) Is ready to introduce a different facet when information on one point gets thin and ragged.
 - b. Knows how to manipulate the group.
 - (1) Calls on those who are anxious to participate.
 - (2) Catches an indication from those who are shy and calls on them at just the right moment.

(3) Never embarrasses any member of the group.

(4) Does not allow one person or one group to monopolize the discussion.

3. The group:

a. Individuals participate by:

(1) Expressing their point of view.

(2) Listening to another point of view.

(3) Critically evaluating both.

b. Arrives at some conclusion. (This may be a summation of conflicting points of view.)

Discussions need continuous and careful guidance. Gifted children may tend to become limited in their thinking unless they are continually challenged by the question: "How do you know?" "Who said that?" "What gave him the authority to say so?" Training children to think in this manner is the responsibility of every social studies teacher. This responsibility must be started very early in the elementary school and continued throughout his formal education. In no other subject is the opportunity to teach evaluation and critical thinking so great.

Discussion is a means whereby opinion can be changed, ideas crystallized, and new concepts formed. In a democracy the outstanding minds must know how to manipulate social dynamics for the welfare of society. People are more inclined to accept ideas if they have an opportunity to thrash them out in words. Leaders need to know not only the background of the social problem, the problem itself, and the many possible solutions but also how to get the public to see what they, as leaders, see and to find out which of the probable solutions would be possible for the group involved.

A larger and better school system may be needed in a community. The social scientist may recognize the value of such a school system to the community. It is a growing community. The child population is increasing. Attractive business opportunities are bringing in upper-class citizens. Professional men are interested in moving into the town. Scientists are coming to do research in the laboratories connected with the mills. The question of adequate schooling is uppermost in the minds of these people. The growth of the schools is handicapped by finances. Finances are held captive by taxes. Taxes are bound by old obsolete laws. Laws are not easily changed. What was good enough for our fathers is good enough for us! An attitude is hard to break down. People must be moved to change their attitudes; only then will they change the laws.

This is a hypothetical illustration. In reality the chain of thought could stop anywhere and still need group action for progress. To get a group to change the status quo is difficult. It is much easier to build in a new community than to change something in an old one, but our country has grown to the point where it can and must be done. If, as a social scientist,

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basic to our democratic society. Instead of mere tolerance of others, attitudes springing from social service should develop honest respect for each person's contribution. Choosing people for social activities then must be based on ability to perform the given task.

Social activities are always at hand; they are easily determined and are tasks that need to be done. Someone must do them. In the typical classroom there are children who have completed their academic work and who can do added assignments efficiently and with dispatch. Faced with the problem of keeping these fast learners gainfully occupied, teachers have frequently turned to social activities and defended their use of them on the basis of teaching these fast learners to assume social responsibility. In this manner social activities have been substituted for mental activities to keep the gifted child busy. The basis of selection is wrong, and the concept of social interdependence is lost.

The mentally gifted child, like every other child, should serve society as one of its members. He will bring to that service his capabilities, developed to their highest potential or dwarfed by a lack of opportunity. Being a good citizen and participating in democratic living is a responsibility common to all children. Each must contribute the best that he has, this is integration at its best. However, the gifted child has an added responsibility to society; he can best serve society by developing his own mental capacity to its fullest and by serving society with the products of his mind.

Developing social responsibility is an educational duty. Just as the teacher is responsible for the development of the intellect of the mentally gifted child so he is responsible for making the gifted child aware of his obligation to society, to which he is indebted for his education and his heritage. Although separate consideration is given here to social studies as a discipline and social activities as a means of training for social responsibility, they must be closely interwoven in the classroom.

Social responsibility is a result of feeling a personal need for social interdependence. Social interdependence is achieved when each individual sees value in the other's contribution and feels his own has been accepted as valuable by the group. The social activities of a school, therefore, should offer all children those activities that make this possible.

The mentally gifted child has more in common with all children than he has differences. Being a part of the social whole is one of the most essential experiences that all children have. Not only do they like to feel social approval but also the strength found in the group. As members of the group they participate in all the activities of the class. Any program that seeks to develop mentally gifted children in isolation and then tries to superimpose a sense of social obligation upon them fails in the most crucial aspect of their training.

Selection

Selecting children for social activities is important because of the attitudes which will evolve. This is particularly significant for the child, because his acceptance by the group or his rejection of the group may have far-reaching effect. Children should be selected for social activities because of their ability or their interest in doing the work at hand. Some children enjoy organizing games for younger children. Others are truly "born" teachers and can conduct younger classes under a neighboring teacher's watchful eye until a substitute can be procured. Some are good salesmen for the United Fund or Goodwill Industries, while others are good at handling money for the sale of milk, lunch checks, or savings stamps. All children have their capabilities in varying degrees, and they should have equal opportunity to participate in these services.

The mentally gifted child should be selected for social activities on the same basis as other children. When this is done, he has an opportunity to regard society from a different point of view. He then is on an equal basis with people who may be mentally less capable than he is but who can perform the task equally well or better than he. In such situations he will gain a new perspective, which would be lost if these activities were reserved for those who finish their academic work first.

Selection based on ability to contribute is understood and accepted by the group. If a boy is chosen for the track team because he can run fast, this is acceptable. It makes no difference who chooses him: the coach, the captain, or the class. It is right. It is understandable and thus acceptable. If he is later chosen as captain because he can think up good plays for the team, this, too, is understandable. To the group this has nothing to do with the fact that he is top man in math.

In like manner, if he is chosen for a task that requires patience because of his demonstration of this trait or is chosen to help with stage scenery because he is able to design it, he meets people on a different plane. He can draw and paint with this group and share ideas that are related to the work in which they are engaged. This brings about a social acceptability based on common interests.

Some unfavorable outcomes may emerge when a child is selected to do a service for the school because of his high intelligence. He may be envied not because of his ability to do outstanding academic work but because of the honor of doing the tasks all would like to do. Envy may lead to rejection by his age peers. On the other hand he may acquire a feeling of unearned and undeserved superiority because of the prestige of being chosen on a false basis. The attitudes produced in such situations are negative and do not develop a feeling of social interdependence, much less social responsibility. More likely, social snobbery increases on everyone's part. A perceptive teacher must work through these problems with understanding and insight.

Activities

In working toward integrating groups, teachers have been encouraged to have each member of the class working on a project contribute that which he is able; the gifted child to do the research, as it were, and the slowest to do the sawing and hammering. The theory was that through these services to a cooperative unit each will admire and respect the other's contribution. The gifted child is more likely to respect the attributes that take brawn if he, too, is chosen to work with this group because of his ability to do the same things they are doing. He will gain the admiration of his co-workers in this way more so than if his contribution was made through his mental ability alone. Also, he can accept the work of the slower child more easily if he himself has experienced the same activities.

If the child is selected to sell Savings Stamps, cafeteria lunch checks, act as the treasurer of the school, or in any way handle money, perhaps he should be the top man in math. This, too, is acceptable. Because of the monotony of such a piece of work, perhaps the gifted child may need to learn his responsibility in being faithful in such a position.

The same care should be used in choosing people for the school patrol or for any of the school services. Those children who understand how to control others in order to prevent accidents, who are respected and obeyed by boys and girls, who themselves conform to safety regulations for patrols even when those adults in authority are not present, who are citizens that other children can emulate are the pupils who should be selected to serve on the patrol, without consideration of their mental ability. Gifted children most certainly will be among these. All have a responsibility to serve; all should feel called upon to accept this responsibility.

Service on the student council may offer a somewhat different problem, depending on the function of the student council in the particular school. This is a service which is more likely to depend on the mentality of the representatives for its effectiveness in the school. It would be helpful to have as many gifted children serve here as possible. In most schools it is an elective office, and where it is carried out in a democratic manner, the election rests in the hands of the class. The mentally gifted child must, therefore, learn how to get people to elect him. He must make people like him. He is needed in the student council, and he must get there through popular vote. Sometimes the school authorities say that only those who have a certain scholastic standing may be elected. It would be better if the mentally gifted child is selected not because of his mental ability but through his own use of it. When he is elected, he brings to the student council his superior ability. Here he meets others less and more capable than he is. He has an opportunity to put into practice some of the skills that he has previously learned. He learns to influence others to accept that which he feels is best for the group.

Because gifted children have the potential for positive character traits, they, in conjunction with their knowledge and understanding of the social studies, should be encouraged to develop strong moral attitudes. This training is not exclusively for them, but because of their ability they will understand and see truths more clearly. Their ability to foresee conclusions and outcomes is an added asset in the development of high moral standards.

The social activities of the school should reflect those of the community. *Though in some respects the child in school is preparing for life, we must never forget that for him it is life.* In studying social studies he has learned of man's relationship to his environment, man's relationship to man, and man's responsibilities. Much of this was done vicariously through reading, seeing, listening, and discussing. At the same time he has been living in a society both at home and at school where he has had experiences that, too, have developed his attitudes and shaped his personality.

Just as he has had to recognize the responsibilities for acquiring knowledge and putting that knowledge to positive use, he also must learn to accept the civic responsibilities that are his. *Civic projects of all kinds, both in school and out, will make children aware of duties that might otherwise go unobserved.* Often the busy teacher feels such projects are just another task to be performed because some outside agency has asked the school to help. But, to the teacher who is interested in social activities as well as the social studies, this is a golden opportunity to help the citizens of tomorrow see the needs of the community, accept the responsibility of correcting defects, and work together to achieve a common goal. The Parent-Teacher Association could give young people many such life experiences by having a student represented on their boards. This would provide early training in group approach to civic problems.

Election time offers a splendid opportunity to unite the class in another such project. With younger children a mock election gives an opportunity to live through procedures in which men who are elected to office participate. The class can be divided into two parties. Then starting with the selection of the candidates of each party at the party conventions, they can experience step by step the election of a President.

When it comes time to prepare the platforms, many national issues can be proposed and studied. If it is to be a local election, community problems will be reviewed. The mentally gifted child's contribution here is quite obvious. As he brings all sides of issues to the attention of his classmates, he learns to face facts fairly and present them honestly. Since these are family interests as well as school interests, his information will be carried to many different homes by his classmates.

Even if the teacher or the school does nothing more than provide the children with the ballots on which to vote and instructs them on the way

that our elections are run, it is a step in the right direction. Mock elections in school help to impress children with this very essential civic duty. One group was so impressed that they made a class project out of going from house to house asking the people to be sure to vote. Then they went back after the election to inquire how many of those they had asked to vote actually did so. The percentage was exceptionally high.

Most cities have "Clean Up, Paint Up, and Plant Up" campaigns and encourage the school children, elementary and secondary, to participate. Again if these campaigns are properly conducted, they also can become an important civic function. Eye sores exist in almost every city. Most people are so accustomed to them that they no longer notice them. Making people aware of them is perhaps not sufficient. A class project in which some of the minor things are corrected by those who like to use a paint brush will do much to improve things in the neighborhood. Planting flowers, bushes, and trees on neglected public property or roadsides by children who have gained permission to do so is an added improvement. Besides these helpful acts, often larger and more important improvements can be made. Though children cannot do these themselves, having been made aware of the need by the more capable students, they can do their part to make people aware of the situation. Children are the best entry into adult minds, particularly those of their parents. Dinner table discussions often lead to action that neither the radio nor television with all their advertising can accomplish. Parents like to live up to the expectations that their children have of them and will do many things to show their willingness to cooperate. Sidewalks can be cleared of groceries or hardware that was set out for display. A smelly creek can be sewered. Trash cans can be provided for paper and refuse. Parents will be more likely to make a contribution in line with their business if asked by their own child to do so. The whole community will become more civic-minded by just such a start in the classroom, sparked by a teacher who recognizes the importance of social activities.

Visitations to community schools or institutions for handicapped children or incapacitated adults or old folks often lead children to offer their services to these places. Some may dedicate their lives to a service like nursing, therapy, or medicine. Others may go into research or surgery. Children should be offered this opportunity to see the needs of the society in which they live. Each should be helped to recognize his own possible role.

Children should be encouraged to help each other. Older children should feel a responsibility to help younger ones. Children selected for this task should be those who can learn to do things because they want to help others, not exclusively because they know the subject-matter better than anyone else, or because they have time on their hands. They should also be selected because they have the knack of explaining, or because they know the terminology of youth and can assist the teacher.

IMPLEMENTATION

The two aims set forth in this chapter are more easily achieved in those schools where there are flexible schedules. In the secondary schools, grouping on the basis of ability comes by natural selection in such subjects as advanced science and mathematics. This is not true in the social studies. However, more classes in social studies could be grouped.

In the elementary school some form of grouping is always used. Most often it is based on chronological age with a few younger or older children mixed in, depending on the promotional policies of the administration. Children are grouped and remain in the class for the day and most often for the semester or year. Regrouping these boys and girls for their academic subjects, even cutting across two or three grades, would give children of all intellectual levels a better opportunity to develop to their highest potential. Each group could have the teacher, the techniques, and the time it needs to master a given subject. Grouping and regrouping prevent isolation and avoid the necessity of the teacher favoring one group at the expense of another. This is an unpleasant decision many teachers have to make because of the wide mental range, varied interests, and needs of the pupils assigned to her. Where grouping by class is not possible, the suggestions made earlier for grouping within the class itself can be used.

The importance of having the mentally gifted child spend a part of each day in heterogeneous groups cannot be overemphasized. He must have social contacts with other children where mental competition has been eliminated. At such times social activities can best be planned and carried out. Yet this program cannot be superimposed. He must feel himself to be a vital part of this group. It must be his community, his homeroom, his class. He must want the class to win the pennants, the trophies, the honors. He must feel proud of his own contribution to the group. So it is in life. A city which has the proper community spirit or attitude will take equal pride in its clean streets, its beautiful parks, its courteous bus service, its ball teams, its contributions to science. Social activities are enrichment experiences. They are an enrichment in living that every child has a right to enjoy.

THE TEACHER

Social studies is a requirement for all children in a democracy. The naturally selective process, which is usually at work in other fields, such as language, mathematics, and science, may not be functioning in social studies because all levels of intelligence may be found in most social studies classes unless grouping of some sort has been devised. Therefore, the social studies teacher must be trained not only in knowledge of subject-

matter itself but also in the psychology of the gifted child and the various techniques for his development. Fundamentally, the criteria for choosing the teacher should include, among the regular requirements of any good teacher, a keener knowledge of subject-matter, wider experience, deeper understanding of gifted children, and an interest in experimental methods of teaching. The experiences of such a teacher should be wide and varied. He should have visited some of the places of which he speaks. If travel is impossible, he should at least have an interest that prompts him to read, to see pictures, and to attend lectures of those who have traveled. A teacher who lacks an interest in the subjects he teaches will fail to inspire his students to delve more deeply and to share with him the results of their research.

In order to challenge the gifted children in social studies, the teacher need not keep ahead of each child as he pursues his special interest or even of the group as they develop their interests, but he must have traveled a similar road so that he can guide and direct their learning. He needs to understand the joy of discovery, the satisfaction that comes with the answer found to a puzzling question, the frustrations that result from a problem that remains unsolved. He can demonstrate the insatiability of hunger for knowledge by learning from them as they search deeper and deeper or farther and farther afield. Essential to a social studies program is a capable teacher who is still willing to learn.

SUMMARY

The mental maturity of a gifted child comes when he not only has knowledge but knows how and where to locate further information; not only what to believe and what to disregard, but how to sift the true from the misrepresented; not only how to transmit knowledge but how to be able to do it in such a way that people will accept the information and act upon it. The most valuable contribution that the gifted person can make to society lies in his creative ability. Creative ability may lie latent and undiscovered in many gifted adults. Because it springs from the innermost being, it is, therefore, guarded consciously or unconsciously from the slightest misunderstanding. Once creativity makes its appearance, the environment must be just right or creativity slips away to lie dormant for a longer period or ceases to exist altogether.

Democracy cannot have one group of citizens developed mentally and socially in isolation. Nor can it survive if it sacrifices the mental development of its gifted in the name of democratic education. The social studies program is vital because it fosters the basic attitudes that will perpetuate not only the ideals but also the continuation of our democratic way of life.

Social studies provides an excellent opportunity for the gifted child to do critical, relational, and creative thinking. The subject-matter itself is broad enough to challenge gifted minds at any grade level without the vertical acceleration necessary in some subjects. This fact increases the benefits that the students will receive through the social activities and the contacts with their social peers.

The mental development and the social experiences that gifted children receive in a program of studies planned for their particular needs will in a large measure determine the nature and the extent of the contribution that these children will make in either the social or the physical sciences.

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CHAPTER THREE

The Arithmetic Program

FOSTER
E
GROSSNICKLE

The Sixteenth Yearbook of the National Council of Teachers of Mathematics¹ formulated two objectives for the teaching of arithmetic. These two aims deal with (1) the social significance, and (2) the mathematical phase of arithmetic. The first objective deals with the social applications of the subject. This goal has been paramount since arithmetic was introduced in this country. The mathematical phase refers to number relationships between quantities. These goals still are valid, but they must be supplemented by a third goal. This objective of arithmetic deals with interpretation of our culture.

Our culture today may be characterized as scientific. During the Middle Ages our culture predominantly was theologic. The works of art of that time nearly always featured religious scenes. Today our art depicts air flow scenes rather than religious scenes. An air flow scene typifies a scientific culture just as a religious scene typifies a culture that is theologic.

Mathematics is the key which unlocks the mystery of science. Arithmetic forms

¹ Published by the Council in 1941.

the foundation for further study of mathematics. As Gauss aptly stated, "Arithmetic is the queen of the mathematics." Therefore, one of the chief objectives of the teaching of arithmetic today is to enable the pupil to understand the world in which he lives. To express the idea in more applicable terms, one of the major objectives of the teaching of arithmetic is to create within the pupil the desire and felt need for further study of mathematics.

The three objectives given apply to *all* pupils in the elementary school, but the mathematical and cultural phases of arithmetic are especially important to the gifted pupil. He must discover and understand mathematical relationships among numbers in order to successfully continue his study of mathematics.

The age of automation, which began at approximately the time of World War II, is making a revolutionary change in the field of arithmetic. This new revolution is relieving man of the burden of computation. Now the emphasis is placed on the understanding of an arithmetic process, when the process is used, and the sequence of using processes instead of on performing the actual computation with the process. The calculating machine will do the drudgery of computations, but it can never do the thinking required to select the process or the sequences of processes in solving a quantitative problem. A calculating machine can perform, in a fractional part of a second, computations that would require many hours for a skilled mathematician using paper and pencil. Therefore, we must encourage and train our pupils in arithmetic to think through quantitative situations so as to know the steps involved in solving a problem rather than to spend time working on laborious computations found within the different processes. We can reasonably assume that the gifted pupil is better adapted to analyze quantitative situations than is the pupil of average ability or the slow learner.

SPECIFIC CHARACTERISTICS OF THE GIFTED PUPIL IN ARITHMETIC

The identifiable qualities of the gifted pupil in arithmetic are:

1. A high I.Q., usually above 120, as measured on standard mental tests.
2. Extraordinary memory to remember mathematical concepts and principles.
3. Ability to generalize about a quantitative situation from a few specific quantitative situations.
4. Resourcefulness in analyzing arithmetic data and process.
5. Keen quantitative insight into number relationships as expressed in verbal problems.
6. An unusually advanced knowledge of mathematics.

A simple definition given by Witty describes talented pupils in arithmetic. He characterizes any child as "gifted" whose performance, in a potentially valuable line of human activity, is consistently remarkable.² According to this definition, any pupil is gifted in arithmetic who shows a very superior achievement in that subject. The discussion which follows assumes that the gifted pupil in arithmetic possesses that characteristic.

EMOTIONAL ATTITUDES OF HIGH ACHIEVERS IN ARITHMETIC

Arithmetic has long been a source of emotional disturbance to many pupils in the elementary school. After the first grade it has caused more failures than any other elementary school subject. Although there would be no failures among the gifted as defined above, the emotional balance of the pupils who excel in this subject should be noted.

Haggard investigated the emotional behavior of the gifted pupils in all areas of the curriculum. He found that pupils who excelled in arithmetic were most stable emotionally. In discussing high achievers in arithmetic, Haggard concluded as follows

the arithmetic achievers had by far the best-developed and the healthiest egos, both in relation to their own emotions and mental processes and in their greater maturity in dealing with the outside world of people and things

The high arithmetic achievers could express their feelings freely and without anxiety or guilt; were emotionally controlled and flexible; and were capable of integrating their emotions, thoughts, and actions. Similarly, their intellectual processes tended to be spontaneous, flexible, assertive, and creative. Of the subgroups studied, the arithmetic achievers showed the most independence of thought, were best at maintaining contact with reality and at avoiding being bound by its constraints, and could function most effectively in the realm of abstract symbols

In their relation with authority figures and peers, they were more assertive, independent, and self-confident than were the children in the other subgroups.³

Haggard's study shows conclusively that pupils who achieve well in arithmetic possess excellent emotional stability. Therefore, the mental hygiene of the arithmetic classroom should be most wholesome for the development of healthy personalities for pupils demonstrating superior ability in this subject.

MEANS OF DEALING WITH THE GIFTED IN ARITHMETIC

Four different ways to provide for the arithmetically gifted in the instructional program may be characterized as follows:

1. Acceleration in the arithmetic program
2. Segregation for instructional purposes
3. Enrichment
4. Level of operation.

Acceleration suggests that the gifted pupil may complete the arithmetic curriculum of the elementary school at an earlier age than the intellectually average youngster. Segregation suggests that the pupil, grouped with equally gifted peers, may receive more advanced work than is given to his intellectually average peers. Enrichment implies that the curriculum is broader and richer in content than the curriculum provided for other pupils. Finally, the level of operation refers to the depth of thinking involved in a pupil's way of working in arithmetic. The level of operation is an index of a pupil's insight into numbers and provides a measure of his understanding of the subject.

QUESTIONNAIRE ON PRACTICES IN DEALING WITH THE ARITHMETICALLY GIFTED*

Recently most school systems have awakened to the need for providing for the gifted pupil. This is true especially in the fields of mathematics and science. In order to determine the extent and the nature of the provisions for the gifted in arithmetic, the writer made a list of the things he considered important in this field. These items were included in a questionnaire which he sent, in October, 1958, to the directors of the curriculum in 400 cities throughout the United States having a population of at least 25,000. Returns were received from 253 cities, or approximately 63 per cent of the cities sampled. The questionnaire was entirely factual and objective. None of the items called for subjective data or opinions. The questions asked or the information requested with the per cent of responses given to most of the items on the questionnaire are as follows:

1. Are you making any special provision in arithmetic for the gifted pupils in your school system for grades 1-8 or any part of the grade system?

1. Yes, 93%; No, 7%.

If you checked YES, please check the remaining questions.

2. a. Do you segregate or group arithmetically gifted pupils together in the elementary school?

2a. Yes, 59%; No, 41%.

- b. If so, at what grade level do you begin this segregation?

2b. Grade:	1	2	3	4	5	6	7	8
	17%	4%	10%	16%	9%	10%	24%	10%

* Only those questions which relate to arithmetic are cited for interpretation.

- c. What is the basis of forming these groups? Check possible answers
 2c. I.Q., 32% . School marks, 21% .
 Achievement tests, 31% . Combination of these, 55% ;
 Teachers' judgments, 22% .

3. Do you practice acceleration as a means of providing for the arithmetically gifted?

3. Yes, 48% ; No, 52% .

4. Check a, b, or c.

An attempt is made to provide for the gifted pupil in the elementary school in:

- | | |
|---|--------|
| a. All subject areas | a. 87% |
| b Mathematics only | b 5% |
| c. Predominantly in mathematics and science | c. 8% |

5 Check all of the answers which apply to the use of the textbook. In arithmetic the gifted pupil is.

a Required to solve all examples and verbal problems in the textbook, Now read item b Then check a or b

a. Yes, 5% , No, 95% .

b. Required to solve all verbal problems and as many examples as needed to insure mastery of a process.

b. Yes, 88% , No, 12% .

c. Encouraged to give more than one solution to a verbal problem.

c Yes, 98% ; No, 2% .

d. Encouraged to discover short cuts in solutions of examples and problems.

d Yes, 99% , No, 1% .

e. Encouraged to make and solve original problems

e. Yes, 97% , No, 3% .

f. Encouraged to help the less gifted in arithmetic.

f. Yes, 77% ; No, 23% .

g Encouraged to solve problems without the use of paper and pencil.

g Yes, 99% ; No, 1% .

h. Encouraged to make a concise verbal statement or generalization of a principle which he discovers for himself.

h Yes, 96% , No, 4% .

i. Required to investigate and report to the class on topics of social significance suggested in the textbook.

i Yes, 81% ; No, 19% .

j. Required to work independently of teacher guidance and assistance in completing supplementary assignments.

j Yes, 81% ; No, 19% .

k If there are other things the gifted pupil is supposed to do in connection with the use of the textbook, please list at least one of those things.

6. Operating without the framework of the textbook, the gifted pupil is:

a. Required to report on topics having mathematical significance which he finds in his reading or investigation

a. Yes, 72% ; No, 28% .

b. Urged to read books and magazines which deal with quantitative topics.

b. Yes, 84%; No, 16%.

c. If there are other things without the framework of the textbook, please list one of them.

7. The classroom contains a library or book corner in which supplementary books (not textbooks) are available, such as *The Wonderful World of Mathematics* by Hogben.

7. Yes, 72%; No, 28%.

8. Does your school sponsor an arithmetic or a mathematics club?

8. Yes, 24%; No, 76%.

9. Do you have any printed material available describing the program for the gifted in the field of arithmetic?

9. Yes, 18%; No, 82%.

The questionnaire may be divided into three parts. Part I includes items 1-4. This part deals with the identification of the arithmetically gifted and the type of program offered. Part II consists of item 5 with its ten subdivisions and the supplementary item. This part of the questionnaire deals with the means utilized for meeting the needs of the gifted within the framework of a textbook. Part III consists of items 6-9. This part deals with the utilization of materials and experiences without the framework of a textbook.

INTEREST IN PROVIDING FOR THE GIFTED

Item 1 on the questionnaire shows that the ratio of cities that do and do not make educational provisions for the gifted is about 13 to 1. The widespread interest in providing for the arithmetically gifted is due to the crisis in our manpower shortage in technological areas. The great emphasis and need for trained personnel today is in the field of science and mathematics. However, current practice shows that provision for the gifted is not confined solely to these areas (Item 4). Only 13 per cent of the replies from the school centers sampled by the questionnaire indicated that special training in the elementary school is directed towards preparing the gifted pupils in mathematics and science. This is a commendable feature. It would be a short-sighted program to restrict the education of the potential future scientists by beginning specialization at the elementary school level.

ACCELERATION IN ARITHMETIC

According to the results obtained from the questionnaire, current practice is almost equally divided between using and not using acceleration (Item 3). A limited amount of acceleration is desirable for the gifted pupil in arithmetic.

The arithmetic program of the first six grades in the great majority of textbooks on this subject deals with the structure of the number system, basic processes in whole numbers, common and decimal fractions, and perhaps percentages. Therefore, the new work for grades 7 and 8 consists chiefly in dealing with some phase of percentages, social applications of per cent, such as insurance or taxation, informal geometry, proportion, and square root. This material either can be telescoped or deleted and taught successfully to the gifted pupil in a period of one year. The gifted pupil would begin the study of algebra at the start of the eighth grade and not at the beginning of the ninth year as provided in the traditional program. In this way the pupil saves one year in his educational program in the field of mathematics. Dropping some of the social applications of arithmetic in grades 7 and 8 as now offered may be necessary; but these topics have limited value to the gifted pupil because they do not lead to the development of power and insight into the structure of mathematics. This type of acceleration is strongly recommended for the gifted pupil in arithmetic. Also, the work of the first six grades should be enriched so that acceleration is not necessary to meet the needs of those who excel in this subject.

SEGREGATION IN ARITHMETIC

Segregation is another term denoting some kind of ability grouping. The different forms of ability grouping for arithmetic may be designated as follows:

1. Homogeneous grouping
2. Cluster grouping
3. Cross-grouping or workshop type
4. Subgrouping.

In reality, grouping takes one of the two forms: heterogeneous or homogeneous grouping. In practice homogeneous grouping is largely theoretical, hence we should designate groups traditionally called homogeneous groups as the "less heterogeneous groups." Cluster grouping and cross-grouping are in reality modifications of ability grouping. Items 2, 3, and 4 above are classified as separate forms of grouping because of the administration of a program in which these forms of ability grouping are used.

RESULTS ON SEGREGATION FROM THE QUESTIONNAIRE

The questionnaire showed that the ratio of the number of school centers which practice some form of segregation to the number of centers which do not segregate pupils is approximately 3 to 2 (Item 2).

The data from the results of the questionnaire are based on the assumption that gifted pupils are segregated into separate classes or schools.

The two grade levels where grouping in arithmetic most frequently begins are the first and seventh grades. The number of schools starting grouping in the fourth grade is only slightly less than the number for the first grade. According to the frequencies, the data show that the initial grouping of the gifted begins predominantly in the seventh, first, and fourth grades. Approximately 25 per cent of the initial grouping begins in the seventh grade, and almost 60 per cent of the grouping begins in the three grades enumerated.

The results of the questionnaire show that most school centers use a combination of I.Q., achievement tests, and/or school marks as a basis of deciding upon the pupils to be segregated (Item 2c). None of the schools sampled formed the groups on the basis solely either of school marks or the results from achievement tests. The questionnaire did not ask for the I.Q. level used as a basis for the selection of the gifted pupils. However, the printed material received from some of the respondents revealed the critical I.Q. used for grouping. In 24 of the school centers the range of I.Q. was from 115 to 140. Ten of these centers used an I.Q. of 125; hence, the modal I.Q. was 125 and the median I.Q. was approximately 130.

CLUSTER GROUPING

Cluster grouping is a form of homogeneous grouping. In cluster grouping all classes in a given grade in arithmetic meet at the same hour. A minimum of three sections or classes are required for the program to be effective. This plan is carried out in some schools in Santa Monica, California. To illustrate, the four sixth-grade groups in a certain school meet at the same hour, such as from 9:00 to 9:40, for arithmetic. Miss Smith may be the teacher of the high group. These pupils are selected from her own class section and from the other three sections of the sixth grade. Excellence in arithmetic is the basis of the formation of the high group. The pupils in this group cover a greater area in the field of arithmetic than the usual work for the sixth grade. A pupil who is unable to keep pace with other pupils in the high group is transferred to the next lower section. Groups formed according to this plan are more fluid than are most groups formed according to general ability. The distinguishing feature of this plan is the opportunity it affords the teacher to enrich the program for the pupils who excel in arithmetic. The plan is not feasible for less than three sections of a given grade.

CROSS-GROUPING

Cross-grouping sometimes is known as the workshop plan of grouping. Under this plan the gifted pupil remains in his regular class for part of the day. During the remainder of the day he goes to a special teacher for more advanced work in a given subject, such as arithmetic. This special teacher frequently is known as a resource teacher. Cross-grouping is not practical in small schools because of the need for supplying the extra teachers required to make the program effective.

An illustration of a program using cross-grouping can be found in some of the schools in Dade County, Florida, particularly in Miami. The Dade County plan permits the gifted pupils to maintain their places socially with pupils of their own chronological age. Pupils who are advanced in their arithmetic skills and understandings are given enriched experiences in problem solving, number puzzles, and social applications of arithmetic. The resource teacher endeavors to expand the acquired skills in practical applications and in creative activities. Cross-grouping provides a form of administrative machinery for introducing a program of enrichment for the more able learners in arithmetic. The effectiveness of the program depends upon the kinds of experiences provided and the activities participated in during the pupil's work with the resource teacher.

SUBGROUPING

Subgroups are formed according to the nature of the work involved. Occasionally the class should function as a whole. In a discussion involving the social applications of arithmetic, for example, there should be no subgrouping; the same situation applies in introducing a new topic or process, such as addition of fractions in the fourth or fifth grade. Each pupil should have fractional cut-outs to use in adding fractions. After one or two illustrations involving fractions are introduced by using these materials, the fast learners will discover how to add fractions without the use of any supplementary aids. These pupils are able to refer to their textbook and understand the verbal explanation given in their text on how to add fractions. The slower learners may need further illustrations with cut-outs or other exploratory materials or aids to understand the process. The gifted pupils who understand the work should be given assignments dealing with symbolic materials, such as are provided in a textbook or workbook. The group of slower learners who must use aids in adding fractions and rapid learners operate at different levels of abstraction. The teacher forms subgroups within the class according to the level at which the pupil is able to

operate and understand the work. The groups formed are fluid and may change from day to day as new topics and processes are introduced.

The effectiveness of subgrouping depends upon the type of differentiation of the curricular materials used or upon the degree to which the level of operation is emphasized. The most favorable feature of subgrouping is its simplicity. It is adaptable to any classroom. All of the pupils in a class may deal with the same topic, but the level of operation at which each pupil performs a process determines what provisions should be made to differentiate the work for variations in ability. The effectiveness of this plan of grouping depends upon the skill the teacher exhibits in dealing with different groups within the same class.

Regardless of the plan of segregation offered, some form of ability grouping in arithmetic is desirable. This is true because ability grouping lessens the burden of the teacher and provides for the welfare of the pupils. Although ability grouping will not create homogeneous groups, it will make the groups less heterogeneous than groups formed at random. The slow learners in arithmetic will be in a different group from the most able learners. The teacher can adapt more easily the kind of program needed when each group is segregated than when the two groups are integrated.

ENRICHMENT IN ARITHMETIC

The third and fourth ways of dealing with the gifted pupil are labelled as enrichment and level of operation. The literature dealing with provisions for the gifted that has come to the attention of the writer makes no distinction between the interpretation of enrichment and of level of operation as they pertain to arithmetic. Level of operation implies power in quantitative thinking which does not necessarily characterize enrichment. Power in quantitative thinking implies facility to interpret and use numbers in varied situations, to discover number relationships that are not evident, to formulate a pattern or to make a generalization characteristic of a particular group, and to understand basic principles governing the operations of the four processes of arithmetic. The use of symbols involves a high level of operation characteristic of a power activity and is potentially one of the best means of enrichment possible. Experiences that produce power represent enrichment, but enrichment does not necessarily lead to the development of power.

Every pupil in arithmetic must be provided with some form of enrichment. Enrichment in arithmetic demands the use of manipulative materials and experiences which supplement the textbook. Such activities as library work, research, community projects, participation reports on current items from newspapers, displays for bulletin boards, and work on experience units typify enrichment. Very probably none of these activities can be classified

as an experience which helps to further development of power in the use of numbers.

Enrichment may be either horizontal or vertical. The activities already enumerated are typical of *horizontal enrichment*. *Vertical enrichment* consists of participating in activities that will create depth of understanding in dealing with numbers. These are the activities that lead to the development of power. Glennon⁴ compares vertical enrichment in which the curriculum is narrow with a racing car. The driver of the car sees little of his environment as he speeds on to his goal. On the other hand, horizontal enrichment is comparable to the driver of the car who has the opportunity to make side trips to explore his environment. In a program of horizontal enrichment, the pupil can explore the less frequently used aspects of the body of knowledge of arithmetic to enrich his understanding of the subject and its uses. Glennon makes a plea for horizontal enrichment. There can be no disagreement regarding this view. However, the writer does not consider vertical enrichment as characteristic of a narrow curriculum. Both phases of enrichment are essential activities for the gifted pupil. The proposals made by Glennon for caring for the gifted are in agreement with this view. Development of power in dealing with numbers is designated differently from enrichment in order to give proper emphasis to the level of operation characterized as an essential part of the program for the gifted in arithmetic.

Although enrichment in arithmetic may be either vertical or horizontal, no research proves that either provides the better means for dealing with the gifted pupil. The effects of enrichment are predominantly unknown quantities. The term suggests different things to different people. In the absence of conclusive experimental evidence, the best procedure to follow in applying techniques of enrichment, as now practiced, is to assume that both techniques are effective for gifted pupils. This point was well presented in a recent publication:

. . . enrichment, like the weather, is something everybody talks about but few do anything about. We really don't know what enrichment is. Does it mean accelerated coverage of a standard course of study followed by advanced content in a given discipline, such as completing elementary algebra in the eighth year and thus, in the twelfth year, having time for a course in calculus? Or does it mean dipping more deeply or extensively in selected areas. . . ? Or does it mean increased independent and creative work in some field of individual interest? Perhaps the word enrichment is a misnomer; perhaps what is needed is not embellishment of existing course content but *different* content. Despite the plethora of "promising practices" suggested by and for teachers, these questions remain unanswered.⁵

⁴ Vincent J. Glennon, "Arithmetic for the Gifted Child," *Elementary School Journal*, Vol. 58, November 1957, pp. 91-96.

⁵ Miriam L. Goldberg, "Recent Research on the Talented," *Teachers College Record*, Vol. 60, December 1958, pp. 156-57.

In the absence of research, judgment must be used to determine the course to pursue in dealing with the education of the gifted. The writer looks upon learning as a thinking process. A pupil learns best when he discovers for himself a fact or principle. Any activity which requires a pupil to discover a pattern or relationship between quantities presents an effective learning situation in arithmetic. For that reason the use of activities which develop power in dealing with number will be considered effective means of challenging the gifted in this subject.

Differentiation Between Level of Operation and Enrichment

An illustration of the difference between level of operation and enrichment in dealing with a quantitative situation will help to clarify the distinction between these two procedures. Recently the writer traveled by car from New York to New Orleans. Speed limits of different states traversed were posted along the highway. In one state the speed limit for day driving was posted as 65 m.p.h. and for night driving, 50 m.p.h. A natural question arises: What is the per cent of change in the maximum legal speed from night to day driving, or vice versa? The first problem is easy to solve because of the numbers involved. The change in speed is 15 m.p.h., which rate is to be compared with 50 m.p.h. A pupil who understands how to find a per cent of a number will express the result as the fraction $15/50$ or $3/10$ and then as a per cent, or 30%. The pupil who has more insight into number will discover that 50 is half of 100. Since $15/100$ equals 15%, $15/50$ will be twice as much, or 30%.

The problem of finding the per cent of change from day to night driving is more difficult to compute. Three solutions requiring different levels of quantitative thinking are as follows:

1. The difference between the two numbers is 15, which is compared with 65. Express $15/65$, or $3/13$, as a decimal and then as a per cent. The answer is approximately 23%.

2. The fraction $15/65$, or $3/13$, is a little less than $1/4$. Since $1/4$ equals 25%, the per cent of reduction must be a little less than 25%, approximately 24%.

3. The denominator, 65, of the fraction $15/65$ is near $66\frac{2}{3}$, which is equal to $2/3$ of 100. Therefore divide 15 by $2/3$. Dividing by $2/3$ is the same as multiplying by $3/2$, hence $15 \times 3/2$ is equal to $22\frac{1}{2}$, or approximately 23. Therefore, the per cent of reduction in speed from day driving to night driving is approximately 23%.

Each solution demands a knowledge of numbers. The pupil who can give the second and third solutions of the problem has deeper insight into numbers than the pupil who can give only the first solution. All pupils who study how to find a per cent of change should be able to give the first solution.

The gifted pupil who develops power in dealing with numbers should be expected to give all three solutions. The slow learners would not be able to give the second solution although the thinking involved in this solution is not at the high level of insight into number which is demanded in the third solution. The more able learners could approximate the answer as shown in the second solution, but only the most able learners in arithmetic would discover the third solution. The gifted pupil who gives the third solution exhibits power in quantitative thinking.

A class discussion in arithmetic may deal with speed laws and their variability among the different states. The teacher may have one or more groups of pupils report on the legal speeds recognized in different states. This project would require research. Very probably the pupils would consult a book of facts, such as the *World Almanac*, to find the legal speed limits established by the different states. An activity of this kind is what may be designated as horizontal enrichment. The pupil must be able to locate material and record data to complete the project. An activity of this kind is commendable, but it does not lead to the development of power in dealing with numbers. Slow learners may be successful in performing activities of this kind. But horizontal enrichment of this kind does not challenge the pupil gifted in arithmetic to develop number power. Some horizontal enrichment experiences are excellent for the gifted, but predominantly pupils in this classification need experiences that challenge them to think deeply when dealing with numbers. The level of operation at which the pupil arrives at a solution of a problem is an index of his understanding of numbers. We shall designate an activity which challenges depth of thinking as a power activity; an activity which merely provides informational knowledge of numbers as horizontal enrichment.

The School Library

The school library should be the heart of the program for horizontal enrichment. This type of enrichment results predominantly from participating in activities and reading of materials without the framework of the textbook in arithmetic. Over 70 per cent of the schools sampled have gifted pupils make reports after reading supplementary topics having mathematical significance (Item 6a). About 85 per cent of the responses from the school centers indicate that pupils are encouraged to read in books and magazines those articles and topics which deal with quantitative data. The frequency of these practices indicates that the directors of school centers look with great favor upon the use of supplementary reading as a means of providing enrichment in arithmetic for the gifted pupil. This practice is commendable.

The reading facilities for enrichment purposes in many schools are very

inadequate. Almost 30 per cent of the school centers contain neither a book corner nor a school library (Item 7). It is difficult to understand how a satisfactory program of enrichment based on outside reading can be efficiently administered without having either a library or a book corner for supplementary books.

Such books as the *Wonderful World of Mathematics* by Hogben or *Practical Classroom Procedures for Enriching Arithmetic* by Spitzer should be available in the book corner in the classroom or in the school library in almost every school. Three issues of the *Arithmetic Teacher*⁶ contain a list of supplementary books which introduce material covering quantitative concepts. The books are classified as adaptable at different grade levels in the elementary school. This list should serve as a nucleus for building a library for the teacher of arithmetic. The list given in another publication⁷ should be consulted for additional volumes for pupils in the upper grades or in the junior high school.

Recreational Mathematics

Recreational mathematics, such as puzzles and tricks, constitutes one of the favorite forms of enrichment in arithmetic. One of the great benefits derived from this kind of enrichment is the interest a puzzle arouses in the pupils. Most pupils will spend a much greater time in solving a puzzle than they will in solving a conventional problem or example in a textbook. Finding the solution to a puzzle usually gives a greater degree of satisfaction than achieving mastery of an assignment in a textbook. Solving mathematical puzzles may be predominantly entertaining, or it may lead to the development of power in dealing with quantities and the development of insight into number relationships. Two types of recreational or puzzle mathematics are identification of a "thought number" and use of magic squares.

Many variations of the "thought number" type puzzle exist, but one example will suffice to show the pattern employed in making problems of this kind. One pupil asks another pupil to think of a number and to perform certain operations on the number. Then when the performer tells the answer, the first pupil gives the original number. Suppose the pupil who is the performer diagnoses the steps and shows how the other pupil found the

⁶ Ruth Hutchison, Edna Manton, and Marjorie Hofmberg, "The Elementary School Mathematics Library—A Selected Bibliography," *The Arithmetic Teacher*, Vol. 3, February 1956, pp. 8-16.

Adrian L. Hess, "A Bibliography of Mathematics Books for Elementary School Libraries," *The Arithmetic Teacher*, Vol. 4, February 1957, pp. 15-20.

———"Bibliography of Books for Enrichment in Arithmetic," *The Arithmetic Teacher*, Vol. 6, February 1959, pp. 12-16.

⁷ Leo J. Brueckner, Foster E. Grossnickle, and John Reckzeh, *Developing Mathematical Understandings in the Upper Grades* (Philadelphia: John C. Winston Co., 1957), pp. 349-51.

"thought number," as if by magic. The pupil who discovers the pattern in the puzzle develops power in dealing with numbers. The pupil making the discovery understands relationships among quantities and can tell why the puzzle works. Then recreational mathematics is not only conducive for creating interest in the subject but also for developing power in dealing with numbers. A simple type of puzzle pertaining to discovering a "thought number" for about the level of the fifth grade is as follows

Choose any number (not greater than 99) and multiply it by 8; add 16 to that product; divide the sum by 2; subtract 8; tell the answer. (Divide the answer by 4 and the quotient will be the number selected.)

The pupil may not understand the algebraic steps in the representation of the process, but for purposes of clarity, the steps are:

(1) Let n represent the number. Then the algebraic representation is as follows

$$(2) 8n + 16$$

$$(3) 4n + 8$$

$$(4) 4n$$

$$(5) 4n \text{ or } n.$$

$$\frac{\quad}{4}$$

The gifted pupil should discover the pattern for making similar problems. The key numbers to be used in making the puzzle are found as follows:

1. The number used as a multiplier is divisible by the number selected as a divisor.
2. The number added is the product of the multiplier and the divisor.
3. The number subtracted is the same as the multiplier
4. The ratio of the multiplier to the divisor gives the key number to use to divide the answer so as to find the original number.

For example, choose any number, such as 35. Multiply 35 by 6, add 18, and divide the sum by 3. Now subtract 6 and tell the answer. Divide the number of the answer by 2. The quotient will be 35, the number chosen. The solution is as follows:

$$6 \times 35 = 210$$

$$210 + 18 = 228 \text{ (18 is product of 6 and 3)}$$

$$228 \div 3 = 76$$

$$76 - 6 = 70 \text{ (number subtracted is same as multiplier)}$$

$$70 \div 2 = 35 \text{ (6} \div 3 = 2, \text{ the divisor)}$$

The gifted pupil who is not able to discover how to make similar problems has not developed power in this phase of work in elementary mathematics.

Magic Squares

The program dealing with recreational mathematics usually includes work with magic squares. This work may be solely a phase of horizontal enrichment, or it may represent an activity leading to the development of power in dealing with quantities. If the work with magic squares is restricted to making these squares, it is predominantly a form of horizontal enrichment. If the pupil discovers properties of numbers used in the squares, the work typifies a power activity.

Recently the writer observed a fifth-grade class for the gifted in which the work with magic squares was of the enrichment type. The pupils made no discovery about properties of the numbers in the squares. The pupils learned how to make a magic square containing an odd number of cells on a side (similar to the square illustrated). In making a square of this kind, the pupil writes the first number in the middle cell of the first row at the top of the square. The next number should be written in the square diagonally upwards to the right providing the cell for that number is within a column or a row of the square. If that cell is outside the square but above a column, as the cell diagonally upward to the right from cell 1, proceed to the bottom of that column and write 2 in the first cell in that column. Then write 3 in the cell diagonally upward to the right. If the next cell falls outside the square but beside a row, proceed to the left of that row. The plan of proceeding upward to the right, with corrections for maintaining rows or columns, can be followed for the first five numbers. The identification of the sixth cell follows a different pattern. In this case it is necessary to drop to the cell in the next lower row before proceeding diagonally upward to the right. The numbers circled show how it is necessary to change the pattern to make a magic square containing 25 cells.

17	24	1	8	15
23	5	7	14	(16)
4	(6)	13	20	22
10	12	19	(21)	3
(11)	18	25	2	9

A group of fast learners at the fifth or sixth grade level quickly learn to make a magic square containing an odd number of cells on a side. The sequence of numbers in a magic square of this kind always follows the same pattern. Therefore, learning to make a magic square offers little challenge to the gifted in understanding numbers. For that reason an activity of this kind represents horizontal enrichment. The activity is interesting to the pupil, but it does not necessarily lead to the development of insight into numbers.

The teacher should have the class make discoveries about the numbers and their arrangement in a magic square. The following are some of the things the pupil should discover about the numbers in the square shown.

1. The middle number in the square, 13, is the average of the numbers in each row, column, or diagonal.

2. The sum of the numbers in a row, column, or diagonal is equal to 5×13 , or 65.

3. There are five sets of numbers in a square having five cells on a side. The numbers in each set can be identified by the same pattern for locating their positions in the square. Thus, the numbers in the first set are 1, 2, 3, 4, and 5. The circled numbers represent the first number of each new set after the first set.

4. The sum of the numbers in each set can be found by multiplying the middle number by 5, the number of numbers in a set. Thus, the sum of the numbers in the first set is 5×3 , or 15, and the sum of the numbers in the second set is 5×8 , or 40.

5. The sum of the numbers in each succeeding set can be found by adding the common difference between two consecutive sums of sets to the smaller sum. Thus, the difference between the sums of the first and second sets is 25, hence the sum of the third set is $40 + 25$, or 65.

6. The difference between consecutive sets must be 25 because corresponding numbers in these sets differ by 5 and there are five such sets. For a magic square having three cells on a side, the difference between corresponding numbers in consecutive sets is 3. Since there are three sets, the difference between consecutive sets is 3×3 , or 9.

The student who can discover all or part of the facts given above develops power in dealing with number. Activities of this kind challenge the gifted pupil. The discovery of the relationships or the patterns among the numbers is the essential of the learning program for the gifted pupil.

Experience Units

The development of experience units is one of the forms of enrichment recommended in many courses of study for the gifted pupil. Experience units cut across subject-matter boundaries and thus contribute to integration of subjects in different fields of learning. Usually the completion of a unit of this kind demands that the pupil locate data in various subject areas. Finding data in different areas of learning is a worthwhile achievement, but the type of mathematical thinking demanded in a project of this kind usually is not challenging for the gifted pupil.

An illustration of a unit dealing with aerial navigation for grades 5 and 6 is given in a recent book on the teaching of arithmetic.⁸ This unit requires a great amount of research in science books. The amount of mathematics

⁸ Foster E. Grossnickle and Leo J. Brueckner, *Discovering Meanings in Arithmetic* (Philadelphia: John C. Winston Co., 1959), pp. 402-403.

used in completing the unit is limited. The pupil who successfully completes the unit demonstrates a great knowledge of science for a pupil at these grade levels; on the other hand, the unit does not contribute greatly to his knowledge of numbers.

Two other units for grades 7 and 8 are predominantly slanted to the field of arithmetic.⁹ One of these units deals with the cost of operating a car and the other treats of local taxation. The pupil who completes either or both of these units uses numbers in many different situations, but the usage is largely computational. No great depth of quantitative thinking is needed to complete the work. These units have great social significance and are commendable for the average or slow learner, but they have limited value for challenging the ability of the gifted pupil in arithmetic. This is characteristic of most experience units. Their value consists predominantly in providing horizontal enrichment. They should not be considered the most effective way to meet the needs of the ablest learners in the field of arithmetic. Number work should be correlated with other subject-matter fields, but it loses its distinguishing feature of providing a structured pattern of thinking in a program of integration of subjects.

Number Bases

A study of systems of numeration in different number bases affords one of the most effective means of providing enrichment for the gifted pupil in arithmetic; it is a true power activity. It is given as an enrichment activity because at present most textbooks in arithmetic do not include work dealing with any system of numeration except the decimal system. The growing use of digital computers is increasing the importance of other systems of numeration, however. In fact, a recent course of study¹⁰ recommends the teaching of different systems of numeration for gifted pupils in the sixth grade. This grade level is lower than advocated in most courses of study offering this phase of work.

The widespread use of electronic computers also gives different systems of numeration great value, both in practice and theory. Many digital computers use numbers expressed in the binary scale, or base two. Merely from the standpoint of understanding how computers work, it is vital for the gifted pupil to understand how to express a number to any base, such as two, five, or eight. And, this understanding, in turn, reinforces and increases understanding of our decimal system.

The base of our decimal system of numeration is 10. We use nine digits

⁹ Leo J. Brueckner, Foster E. Grossmickle, and John Reckzeh, *Developing Mathematical Understandings in the Upper Grades*, pp. 291-297.

¹⁰ *Elementary Mathematics Course of Study, Kindergarten-Grade Six*, rev. ed. (Rockville, Md.: Montgomery County Public Schools, 1958).

and zero making a total of 10 digits. Any system of notation has as many different digits as the base of that system indicates. Thus, two digits, 0 and 1, are needed to express a number to base two, and five digits are required for base five. The numerals for the first twenty-five numbers in base five are shown on the left.

1	2	3	4	10
11	12	13	14	20
21	22	23	24	30
31	32	33	34	40
41	42	43	44	100

The pupil can learn how to express numbers in different bases by rote learning, but this form of learning should be the exception rather than the rule. The pupil should discover the pattern which characterizes any system of numeration. Knowledge of different systems helps the pupil to form an enriched and vital understanding of the decimal systems.

A pupil's knowledge of the four basic processes in the decimal system of notation should enable him to learn readily how to add and subtract with numbers expressed in different bases. As soon as he is able to change a number expressed decimally in a different base, he should be able to multiply and divide with numbers expressed in a given base. The actual computation with numbers expressed in different bases is not the essential part of the activity. Instead, it is the discovery on the pattern of procedure in dealing with these numbers. The discovery of the pattern represents the learning situation which leads to power in dealing with quantities.

Independent Study

A highly desirable form of enrichment consists in independent study. A teacher may assign a pupil to give a report on a given topic in a supplementary text or in a basic text, providing the class does not plan to explore that same topic. If the pupil is able to read and understand the development given in the text so that he can master the presentation, he exhibits one of the highest forms of learning possible. That pupil demonstrates power in dealing with quantities. An exercise of this kind represents one of the best means of challenging the gifted pupil in arithmetic. About 80 per cent of the replies on the questionnaire indicate that independent study is practiced as an effective way to provide enrichment for the gifted pupil (Item 5j).

Suppose a pupil has a desire to understand and operate a slide rule and the regular work of the class does not call for instruction in the use of a slide rule. The teacher directs the pupil to a book which describes a slide rule and explains how to use the rule. The pupil carefully studies the presentation and follows the sequential steps given and learns to operate the rule. He must understand the presentation in order to teach himself how to multiply, divide, and extract square roots by the use of the rule. This pupil exhibits independence in studying and in mastering the meaning of the topic or process. An activity of this kind stamps the pupil as possessing

power in dealing with technical subject-matter. The ability to succeed with a task of this kind demonstrates that a pupil possesses one of the characteristics identifying the gifted listed at the start of this chapter. According to this trait the gifted pupil is *resourceful in meeting a new situation*.

LEVEL OF OPERATION

The fourth and last major means of providing for the gifted pupil in arithmetic consists in differentiation of the level of operation at which a pupil works. As shown before, this may be closely associated with enrichment. The level of operation at which a pupil deals with a quantitative situation determines whether he demonstrates power in the activity. Activities classified in this category can be done within the framework of the textbook. Therefore, these activities are commendable for two reasons: First, they require depth of reasoning in dealing with quantities; and second, they are easy to administer. No special equipment or supplies are needed to put a program using these activities into operation.

Item 5 on the questionnaire, with subdivisions 5a-5h, pertains to the use of the textbook in dealing with the gifted pupil. It is gratifying to see from the responses to item 5a that only approximately 5 per cent of the schools require the gifted pupil to solve all of the examples and problems in the textbook. These pupils should not be required to solve all of the practice exercises given in most textbooks in arithmetic.

Items 5c, 5d, 5e, 5g, and 5h are concerned primarily with the use of the textbook in arithmetic. These items deal, respectively, with such procedures as encouraging pupils to give more than one solution to problems and examples, discovering short cuts in computation, making original problems, solving problems without paper and pencil, and making generalizations. In each case, nearly every response indicates that these activities are practiced in dealing with the superior pupils in arithmetic. These data show that effective means are being used to have the pupil operate at a high level of quantitative thinking. The questionnaire, however, does not show how effectively these means of enrichment are applied.

THE STRUCTURE OF ARITHMETIC

In order for a pupil to learn arithmetic so that it is mathematically meaningful to him, he must understand its structure. The term structure is difficult to define but easy to understand. We all know what is meant by the structure of a building. The structure is the framework which gives shape and design to the building. Structure in arithmetic conveys the

same idea. The pupil should understand the structure of the decimal system of numeration. This gives the basic design of place value and grouping. A fundamental principle is explained in the following statements. Moving a digit to the left one place in a number multiplies the value of the digit by 10; moving it to the right one place divides the value of the digit by 10.

Basic Principles in Arithmetic

If arithmetic is a structured subject and not a composite of facts, certain basic principles must govern fundamental operations within this structure. By the time the gifted pupil in arithmetic completes the first six grades, he should have discovered the meaning of these principles. The number of fundamental principles which govern the structure of our system of numeration is comparatively small. We have already mentioned the principle pertaining to the value of a digit with respect to its place in a number. The remaining principles are given as follows:

1. The order in which numbers are added or multiplied does not affect the sum or product. Mathematicians designate this principle as the Commutative Law. The teacher should not speak of these laws by their technical names in the elementary school.

2. The addends or the factors, as in the example below, may be grouped in any order without changing either the sum or the product. Thus, $(2 \times 3) \times 6$ has the same product as $2 \times (3 \times 6)$. This is the law of grouping or as mathematicians express it, the Associative Law.

3. To multiply an indicated sum by a number, each addend must be multiplied by that number. Thus, to multiply 34 by 2 which is the same as $2 \times (30 + 4)$, both 30 and 4 must be multiplied by 2. Perhaps a more familiar usage of this principle is given in the formula for the perimeter of a rectangle, as $p = 2(l + w)$ or $2l + 2w$. This principle is called the Distributive Law of Multiplication.

4. Addition and subtraction are inverse processes; multiplication and division are inverse processes. This means that one process nullifies or reverses the other process.

5. Multiplying by a number is the same as dividing by the reciprocal of the divisor. Two numbers are reciprocals that have a product of 1. The reciprocal of 3 is $\frac{1}{3}$; the reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$. Thus, it is easy to understand that dividing 12 by 4 is the same as multiplying 12 by $\frac{1}{4}$. This also means that the formula for the area of a triangle expressed as $A = \frac{1}{2}bh$ also can be written as $A = \frac{bh}{2}$.

6. To multiply or divide an indicated product that contains two or more factors, multiply or divide only one factor by that number. Thus, if $8 \times 3 \times 5$ represents the volume of a prism, the volume of two of these

prisms would be $16 \times 3 \times 5$, but not $16 \times 6 \times 10$. According to the law of grouping any one of the three factors can be multiplied by 2.

7. Both divisor and dividend or numerator and denominator of a fraction may be divided by the same number (except zero) without changing the quotient or value of the fraction. Most pupils learn the significance of this principle in dealing with common fractions. Unfortunately, it is seldom applied to an example in division. Since every division example may be represented as a fraction, this principle should be applied to both situations.

8. The identity element for addition and subtraction is 0; for multiplication and division, the identity element is 1. Thus, adding or subtracting zero to or from a number gives that same number as the answer, as $3 + 0 = 3$ or $3 - 0 = 3$. Similarly, multiplying or dividing a number by 1 gives that number as the answer, as $3 \times 1 = 3$ or $3 \div 1 = 3$.

These eight basic principles govern the structure of arithmetic. One important point about these principles needs emphasis. These fundamentals are not a body of subject-matter to be memorized. Pupils can learn these principles by rote and have applications of the laws identified in class work without having any appreciable understanding of their meaning. *The way the pupil learns and discovers these principles is the important phase of this work.* The pupil must have the kinds of experiences that enable him to formulate the different principles. He should have almost daily application of one or more of the principles in all phases of his number work. The method of discovering the principles and their varied applications give meaning and understanding to them. The discovery of these principles should not be restricted to the gifted pupils, but gifted pupils should be required to understand and use these principles at a high level of efficiency.

The need for a third objective in the teaching of arithmetic was discussed at the start of this chapter. This third aim refers to the teaching of the subject in such a manner that the pupil will want to take more mathematics in order to understand the meaning of today's culture. The basic principles enumerated are essential for further successful study of mathematics. All work in beginning the study of algebra should be based on these principles. Readiness for a subject must be created. Readiness is not a concomitant with age or grade level. The pupil should have experiences in arithmetic which will enable him to understand the principles given when expressed with Arabic symbols. When he studies algebra, he will discover that these same laws hold true when numbers are expressed by letters or variables. In such a program of learning, arithmetic creates a background of readiness for further study of mathematics. The gifted pupil should experience a program of this kind.

We need not show here how to introduce all these principles and their uses. Let us consider the application of some of the principles by using the formula for the area of a triangle, or $A = \frac{1}{2}bh$. One of the most familiar

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8. The identity element for addition and subtraction is 0; for multiplication and division, the identity element is 1. Thus, adding or subtracting zero to or from a number gives that same number as the answer, as $3 + 0 = 3$ or $3 - 0 = 3$. Similarly, multiplying or dividing a number by 1 gives that number as the answer, as $3 \times 1 = 3$ or $3 \div 1 = 3$.

These eight basic principles govern the structure of arithmetic. One important point about these principles needs emphasis. These fundamentals are not a body of subject-matter to be memorized. Pupils can learn these principles by rote and have applications of the laws identified in class work without having any appreciable understanding of their meaning. *The way the pupil learns and discovers these principles is the important phase of this work.* The pupil must have the kinds of experiences that enable him to formulate the different principles. He should have almost daily application of one or more of the principles in all phases of his number work. The method of discovering the principles and their varied applications give meaning and understanding to them. The discovery of these principles should not be restricted to the gifted pupils, but gifted pupils should be required to understand and use these principles at a high level of efficiency.

The need for a third objective in the teaching of arithmetic was discussed at the start of this chapter. This third aim refers to the teaching of the subject in such a manner that the pupil will want to take more mathematics in order to understand the meaning of today's culture. The basic principles enumerated are essential for further successful study of mathematics. All work in beginning the study of algebra should be based on these principles. Readiness for a subject must be created. Readiness is not a concomitant with age or grade level. The pupil should have experiences in arithmetic which will enable him to understand the principles given when expressed with Arabic symbols. When he studies algebra, he will discover that these same laws hold true when numbers are expressed by letters or variables. In such a program of learning, arithmetic creates a background of readiness for further study of mathematics. The gifted pupil should experience a program of this kind.

We need not show here how to introduce all these principles and their uses. Let us consider the application of some of the principles by using the formula for the area of a triangle, or $A = \frac{1}{2}bh$. One of the most familiar

pupil has to think through quantitative situations, and then arithmetic becomes a structured subject. Most important of all, a drill period, which frequently represents mechanical manipulation of numbers, is changed to a learning exercise in dealing with these numbers.

OTHER ACTIVITIES FOR ENRICHMENT

We have discussed the identification of basic principles governing the structure of arithmetic, making generalizations in quantitative situations, and giving a variety of solutions to both examples and verbal problems. The teacher can utilize many other activities to help the gifted pupil to develop power in dealing with number. The use of mental arithmetic (without paper and pencil) in solving "number quickies," approximation of the answer, making verbal problems with and without numbers, special vocabulary exercises, and other activities dealing with quantities, all are effective procedures for classroom activities. Teachers' manuals and many courses of study suggest a wide variety of activities to be used for enrichment. A list of suitable activities for enrichment may be found in the following references.

Charlotte Junge, "The Gifted Ones—How Shall We Know Them?" *The Arithmetic Teacher*, Vol 4, October 1957, pp 141-150

A Mathematics Program for Gifted Pupils, Grades Five and Six (Denver, Denver Public Schools, 1955)

Elementary Mathematics Course of Study, Kindergarten-Grade Six, Revised Edition (Rockville, Md. Montgomery County, 1958)

Handbook on The Teaching of the Elementary Gifted Child (Auburn, Maine, Department of Education, 1958).

Teaching the Talented, Bulletin 1-A (Miami: Dade County Public Schools, 1956).

The activities suggested in these publications deal with both horizontal and vertical enrichment. Both types of activities are essential for providing a satisfactory program for the gifted pupil.

THE TEACHER OF THE GIFTED PUPIL IN ARITHMETIC

The teacher of arithmetic for the most able learners should possess the same attributes which a good teacher should possess for any other type of class. However, the teacher of this special group should possess at least three specific qualifications: First, the teacher must understand the structure of arithmetic and the basic principles governing its structure. The teacher must be able to have pupils identify these principles

in the daily work of the class. Second, the teacher should be sensitive to quantitative situations which arise in the ongoing activities of the class and capitalize on them. Thus, if a pupil reads in his social studies about density of population, the teacher should be certain that the pupil can illustrate or define that term. In the same way the teacher should capitalize on quantitative situations arising in class in all subject-matter areas. Third, the teacher and the pupil should show mathematical growth during the year. Many problem situations are certain to arise which neither teacher nor pupil can answer. The teacher frankly admits, "I do not know the answer or the solution." Then the teacher suggests to the group that together they find the answer. If the teacher possesses these three characteristics as well as the general ability of creating a stimulating atmosphere for learning—a characteristic of any good teacher—then the teacher is well fitted to instruct the gifted pupil in arithmetic.

NEEDED RESEARCH FOR THE GIFTED IN ARITHMETIC

Four problems arise in dealing with the gifted in arithmetic as well as in other subject areas. These problems are:

1. How do you identify these pupils?
2. What materials are best adapted to fit their needs?
3. What instructional materials are to be used?
4. How do you evaluate the learning?

Problems 1, 3, and 4 apply to all areas of the curriculum. Problem 2 applies to each specific subject area, such as arithmetic. Much more research is needed on the kinds of instructional materials best adapted to the field of arithmetic for the gifted.

Some of the specific problems for research dealing with the gifted in the field of arithmetic are:

1. How should the content of the arithmetic program for this group differ from the program for the average or above-average group in this subject?
2. What is the place of supplementary aids, such as audio-visual and exploratory materials?
3. What is the relative value of vertical enrichment to horizontal enrichment?
4. What competency should be demanded of pupils dealing with number bases other than base 10? At what age or grade level should work with different bases begin?
5. What place should work dealing with social applications of arithmetic have in the curriculum of this group?

6. What phases of modern mathematics can be introduced effectively into the arithmetic program of this group?

SUMMARY

In summary, the implications of this chapter indicate:

1 (a) Most of the school centers which responded to a questionnaire make some provision for the gifted pupil in arithmetic. Specific provision of some kind should be made for the upper two or three per cent of the pupils in arithmetic. These superior pupils constitute the group who consistently demonstrate superior achievement in the subject

(b) The ratio of the number of schools that practice some form of ability grouping to the number that does not is about 3 to 2. Gifted pupils should be segregated in some manner, such as in cluster grouping or cross-grouping. In small centers subgrouping should be practiced

(c) There is no one grade level at which to begin ability grouping, but more school centers begin this grouping in grade 7 than in any other grade. A more defensible plan would be to begin this grouping not later than the end of the primary grades, or at grade 4

(d) Nearly half of the school centers practice some form of acceleration of gifted pupils in the elementary school. The gifted pupil should experience normal promotion during the first six grades. The work in arithmetic in grades 7 and 8 should be telescoped into one year so that the pupil may begin the study of algebra in grade 8

(e) Almost all of the school centers make provision for the gifted pupil in all subjects rather than in arithmetic alone or in arithmetic and science.

(f) Enrichment should be both horizontal and vertical. The library should be the heart of the program for horizontal enrichment. Activities within the framework of the textbook should be the chief basis for vertical enrichment. Vertical enrichment leads to the development of power in dealing with quantities.

(g) Approximately three out of four school centers have a school library or a library corner for supplementary books. To have a satisfactory program for these pupils, the school center must have adequate library facilities to provide suitable books for enrichment.

2. The gifted pupil should discover the basic principles which govern the structure of arithmetic and be able to identify these principles in daily class work. These principles form the structure for further study in mathematics.

3. The objectives of the work in arithmetic for the gifted pupil should be to attain competency in dealing with the social significance of the subject,

to discover mathematical relationships among quantities, and to understand our culture, which today is predominantly scientific. The third objective implies that arithmetic is the basis for creating readiness for further study of mathematics. All gifted pupils in arithmetic should be required to pursue further study in the field of mathematics.

4. The teacher who challenges the pupil to understand the structure of arithmetic by providing experiences for discovery of facts and principles and by creating an atmosphere within the classroom to stimulate intellectual curiosity for further study of mathematics offers the kind of program that is best adapted for the education of the gifted in arithmetic.

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CHAPTER FOUR

Creative Mathematics

H. STEWART MOREDOCK

The central theme of a program in secondary school mathematics designed for the gifted student should be creativity. The term "creative mathematics" shall refer in this discussion to a mathematics program in which opportunity is abundant for the student to explore thought-provocative material which leads to his discovery of certain mathematical principles and concepts. The originality in this context is strictly personal to the student and does not apply to the extension of the frontiers of knowledge.

Everyone would agree that creativity and discovery should be basic ingredients of any curriculum for the academically talented student. Thus, the question arises, why should any special point of creativity be made in connection with mathematics? The answer lies partially in the nature of mathematics.

Mathematics is commonly conceived as a body of techniques and rules for manipulations which have been developed and refined by mathematicians over a period of several years. Consequently, there is little chance that a learner is able to im-

prove upon these techniques. Since the manipulations generally lead to a single correct answer, the learner soon feels that mathematics is a very inflexible subject. The elementary mathematical systems commonly encountered in the secondary school program, such as algebra, geometry, and trigonometry, are the end-products of a considerable amount of thought on the part of a great number of highly gifted mathematicians. The symbolism has been refined from crude beginnings so that it is now simple and compact. The rules for manipulations are so highly developed that they can be simply mastered with a minimum of conscious thought on the part of the manipulator. In short, the basic creativity has been accomplished.

One can see how the teaching of mathematics became limited to developing skillful manipulation because of a belief that there was little else to do. Even an understanding on the part of the student as to why the procedures work was thought to be irrelevant until psychological studies showed that such understanding aided materially in the development of the manipulative skills.¹ Consequently, the study of mathematics became pretty much a routine affair, and mastery of information and skills became the primary goal. Because the content of a mathematical system is so compact and closely interconnected, little room seems left for innovation, and certainly tampering with such a well-constructed edifice would be taboo. Thus mathematics seems an "inhuman" subject, standing immutable and not at all responsive to human creativity and spontaneity.

This raises the problem of how the study of mathematics may be made compatible with the capabilities and needs of gifted children. This problem by no means is new. Over 300 years ago, Descartes made the following statement:

When first I applied my mind to Mathematics, I read straight away most of what is usually given by the mathematical writers, and I paid special attention to Arithmetic and Geometry because they were said to be the simplest and so to speak the way to all the rest. But in neither case did I then meet with authors who fully satisfied me. I did indeed learn in their works many propositions about numbers which I found on calculation to be true. As to figures, they in a sense exhibited to my eyes a great number of truths and drew conclusions from certain consequences. But they did not seem to make it sufficiently plain to the mind itself why these things are so and how they discovered them. Consequently, I was not surprised that many people, even of talent and scholarship, should, after glancing at these sciences, have either given them up as being empty and childish or, taking them to be very difficult and intricate, been deterred at the very outset from learning them. But when I afterwards be-
thought myself how it could be that the earliest pioneers of Philosophy in

¹ Wm. Brownell and V. M. Sims, "The Nature of Understanding," *The Measurement of Understanding. The Forty-Fifth Yearbook of the National Society for the Study of Education*, Part I, N. B. Henry, ed (Chicago: University of Chicago Press, 1946), pp. 28-43.

bygone ages refused to admit to the study of wisdom anyone who was not versed in Mathematics. . . . I was confirmed in my suspicion that they had knowledge of a species of Mathematics very different from that which passes current in our time ²

Evidently, Descartes discovered the species of mathematics he was seeking because he went on to make a major contribution to mathematics by developing the beginning of analytic geometry, which combined algebra and geometry. Fortunately for us, he did persist in spite of the obstacles of dull and unrewarding presentation to find an aspect of mathematics that was challenging to him.

Perhaps the experience of Descartes gives us a clue to a solution of the problem of how formalized mathematics may be related to the special needs and capabilities of the gifted. We might simply rely upon the persistence of some of the gifted students to stay with it until they find some aspect of mathematics which has not been fully explored and hence is open for innovation. The students' motivation for this approach would stem primarily from knowing as Descartes knew, that some species of mathematics is amenable to such innovation and creativity.

SOME CURRENT CURRICULUM PRACTICES

We cannot give an account of all the programs which have been developed in various schools throughout the country for the mathematically capable student. Not all of the schools have published information concerning their programs, and, for the schools which have reported, the special variations developed in each program are numerous.

To discuss current curriculum practices for the mathematically gifted without getting involved in a great deal of detail, we shall, for convenience, categorize these practices into those which essentially involve *acceleration* and those which essentially involve *enrichment*. Although most school programs for the gifted include practices from both categories, we shall discuss them separately first and then mention how programs may integrate the features of both *acceleration* and *enrichment*. In the discussion that follows, bear in mind the effect that a particular practice has upon a student's conceptual level of understanding of the mathematical ideas being studied.

ACCELERATION OF PRESENTATION

One way of challenging the more able student is to step up the pace of presentation; that is, accelerate. Two general plans for acceleration

² From *The Philosophical Works of Descartes* by E. S. Haldane and G. R. T. Ross, reprinted by permission of Dover Publications, Inc., New York 14, New York. pp. 11-12.

If the material of the 7th and 8th grade level is accelerated into one year, then important content is bypassed. For example, the student would lose the opportunity to translate situations into numerical language and to discover numerically some of the principles of arithmetic. Likewise some graphing and use of placeholders (variables) may be omitted.

In the final analysis, because the conventional programs in mathematics are geared to an average student, an accelerated presentation of mathematical concepts is necessary. Thus far, however, we have emphasized that an accelerated program which only expedites the coverage of conventional topics and fails to deepen the conceptual level of understanding of the ideas is quite inadequate for talented students in mathematics.

ENRICHMENT

Another very important procedure which is commonly used for the mathematically gifted is enrichment. In general, enrichment refers to a practice whereby the conventional material is supplemented by additional material which broadens and deepens the understanding of the regular work.⁴ Note, too, that enrichment refers to the enrichment of the instruction of mathematics and not to the enrichment of mathematics.

The rationale for the enrichment procedure in mathematics is based upon an acceptance of the conventional sequence of topics and grade placement of topics. The sequence and grade placement of topics in the mathematics program has received a great deal of attention by research studies on the structure of mathematical systems and the maturation of children. The regular mathematics program must be geared to an image of an average student and should tax the full capabilities of these students. The additional challenge necessary for the gifted students is provided for by supplementary material, and hence, the conventional sequence and placement of topics are kept intact.

The supplementary material ordinarily used in enrichment programs for the mathematically gifted can be classified into two categories: extended applications of mathematics, and extended topics in mathematics.

Enrichment Through Extended Applications

Quite often, the topics in formalized mathematics can be made interesting and challenging for the gifted child through extended applications. An abundance of such applications fall in the area of physical science, such as problems in motion, mixtures, pressure, levers, pulleys, gear speeds,

⁴ Pat Jorgenson, "Enrichment of the Mathematics Curriculum for the Superior High School Student" (Master's thesis, Sacramento State College, 1957), p. 14.

forces, liquid volumes, surveying, measuring instruments, and conversion factors. Another rich source is found in the area of business and consumer activities, which involve taxation, installment buying, insurance of different types, budgeting, savings and investments, loans, social security and retirement plans, unemployment and workmen's compensation, and group health plans.

Although the physical sciences and the activities of business and consumer buying provide the bulk of the applications found in the secondary school mathematics texts, there is an ever-increasing availability of applications in such areas as the biological sciences, psychology, anthropology, and other social sciences. A recent publication, entitled *The New World of Math*, by George A. W. Boehm and the Editors of *Fortune*,⁵ gives a vivid account of the new uses and developments of contemporary mathematics. These applications often involve aspects of mathematics not commonly taught in the high schools, and this will occur even more frequently in the future as our technology grows more complex.

The use of extended applications for the gifted children has two distinct purposes: One is to motivate gifted students to study the sometimes dull, formalized topics of mathematics; and the other is to challenge these students to develop deeper understandings of the mathematical topics under study. These purposes are not mutually exclusive, yet to clarify the reasons for providing these applications, we need to make a distinction between them. If motivating the gifted students to study more mathematics is the sole concern, then students need only survey applications of the mathematical concepts being taught long enough to see their possible uses and then return with renewed vigor to the study of the formalized topic. In this discussion, however, our primary concern is to find those particular applications which challenge and extend the student's understanding of what is being studied in mathematics. Many such topics are available if a careful choice is made.

In using mathematical applications for the gifted, certain pitfalls also need to be mentioned. First is the danger of becoming so involved in a study of the material for which the mathematical applications are to be used that the enrichment of mathematical understanding is forgotten. For example, in the physical sciences, one can become too involved in the design of measuring instruments, or in the study of force, motion, electricity, surveying, and mechanics. There is danger in the area of business and consumer activities of overly intense study of such topics as taxation, social security, and the pros and cons of investments and installment buying. A

⁵ George A. W. Boehm and Editors of *Fortune*, *The New World of Math* (New York: The Dial Press, 1959).

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⁵ George A. W. Boehm and Editors of *Fortune*, *The New World of Math* (New York: The Dial Press, 1959).

certain amount of developmental material is necessary to make the mathematical applications meaningful. However, when the non-mathematical topics become too important, then the primary reason for introducing the applications is lost. This important guideline must be carefully watched, especially in dealing with naturally-curious, gifted students whose interests are broad.

Another drawback in the extended use of mathematical applications is the classifying and stereotyping of the applications. Textbook authors are often prone to systematize the various applications and to supply the special techniques for their solutions. Thus we hear of mixture problems, coin problems, rate problems, and conversion problems with all their special diagrams and arrangements of notations which are useful to solve them successfully. In certain areas of applications, problems involving percentage or levers for example, the problems are classified as Type I, II, or III with formulas or procedures stipulated for each type.

The stereotyping of mathematical applications certainly should not be included in a creative mathematics program. Students should develop for themselves any classification, procedure, or device which will aid in the solution of these problems. In the stereotyping of applications, we see a transfer of the formalized procedures which have been developed in the content of mathematics, and this should be steadfastly resisted.

If these two undesirable tendencies just mentioned can be carefully avoided, then the use of mathematical applications is a highly recommended procedure. Great challenge can come from these applications as well as a deeper understanding of the mathematical ideas which are being applied if the application situations are carefully selected and are of sufficient complexity. Primary attention must be given to whether the situations fully exploit the mathematical ideas being used.

So far, we have confined our discussion to practical applications. A word needs to be said about the applications of mathematics to situations which are purely contrived and not likely to occur. If the purposes of introducing applications are examined again, namely, challenging the students and sharpening their mathematical concepts, it is apparent that the application situations need not be practical. As a matter of fact, under certain circumstances applications in the form of puzzles or highly improbable and amusing situations are superior to practical situations. Certainly, if only practical applications available are too complex in their content, then a simple, well-related, imaginary application would be more appropriate. The use of improbable situations may avoid the previously mentioned pitfall of becoming too involved in the non-mathematical content of the application and can be quite challenging. Naturally, too many absurd applications are not desirable either; the judicious use of both types of situations is the best practice.

Enrichment Through Extended Topics in Mathematics

Another form of enrichment for the mathematically talented consists of extending the mathematical topics offered in the program. This type of enrichment is especially pertinent when gifted students become bored with a particular topic after it has been mastered or the applications of the topic offer only a limited amount of exploration.

Enrichment of this type is an extension of the mathematical concepts developed in standard topics to other topics in mathematics. A distinction is made between applying the mathematical concepts of a conventional program to activities outside of mathematics, which was analyzed in the preceding section, and using or relating these concepts to develop within mathematics. Enrichment through extended topics is more concerned with those topics in mathematics which extend and build upon the mathematical ideas of a standard program than with additional topics which introduce ideas outside the field of mathematics.

Mathematical knowledge has been so intensively and extensively developed over the centuries that it now provides rich and abundant material for the kind of extended topics we have been discussing. These topics are excellent supplementary material which is interesting and challenging to the gifted students and deepens their understanding of the conventional topics. The material for these supplementary topics is scattered throughout various sources, some of which are discussed below.

Extended topics may be provided in standard texts in starred sections or exercises or in portions at the end of the book. This is a highly desirable source because it is most likely to be relevant to and an extension of the ideas being studied at the time.

Certain college-level texts in mathematics are a fruitful source of enrichment topics, particularly those college texts which cover high school topics from a more fundamental viewpoint. These texts have had and are having a profound effect upon high school mathematics programs. Some examples of such texts are:

- Allendoerfer, C. B. & Oakley, C. O., *Principles of Mathematics*.
- Banks, J. H., *Elements of Mathematics*.
- Cooley, H. R., et al., *Introduction to Mathematics*.
- Freund, J. E., *A Modern Introduction to Mathematics*.
- Jones, B. W., *Elementary Concepts of Mathematics*.
- Kemeny, J. G., et al., *Finite Mathematics*.
- May, K. O., *Elements of Modern Mathematics*.
- Newson, C. V., *Introduction to College Mathematics*.
- Richardson, M., *Fundamentals of Mathematics*.
- University of Chicago, *Concepts and Structures of Mathematics*.

A more complete list is found in the bibliography at the end of this chapter.

Other worthwhile and productive sources are journal articles, pamphlets

by national organizations, reports of committees, and courses of studies for the gifted developed by school district and state-wide groups. Journals, such as the *Mathematics Teacher*, give suggestions for elaborating or exploring further a conventional high school mathematics topic. Pamphlets and reports outline programs for the mathematically talented. An example of the latter is "Program Provisions for the Mathematically Gifted Student in the Secondary School," published by the National Council of Teachers of Mathematics. Other such reports are listed in the bibliography at the end of this chapter.

Some excellent anthologies of mathematical developments have been written. The most recent and most comprehensive of these anthologies is *The World of Mathematics*, Vols. I, II, III, IV, edited by James R. Newman. Books on mathematics written by prominent mathematicians for general lay reading provide another source worth investigating. Often such books provide highly imaginative approaches to conventional topics. Some examples are Courant and Robins, *What is Mathematics*, Kasner and Newman, *Mathematics and the Imagination*, and Polya, *Induction and Analogy in Mathematics*.

Another new source for enrichment topics is the foundation-supported experimental projects in secondary school mathematics. Prominent among these projects are the University of Illinois Committee on School Mathematics, Commission on Mathematics of the College Entrance Examination Board, University of Maryland Project and the School Mathematics Study Group at Yale University. These groups are providing a rich source of potential material which can be used in programs for the gifted. More will be said later about the implications of these experiments.

The historical origins of the topics taught in high school are often worthwhile for the gifted students to explore. Some of the historical references for mathematics are:

- Bell, E. T., *The Development of Mathematics*
- Eves, H., *An Introduction to the History of Mathematics*
- Smith, D. E., *History of Mathematics*
- Struik, D. J., *A Concise History of Mathematics*

The sources listed above provide an abundance of topics which may be used as enrichment for the mathematically talented student in the secondary school mathematics program. To give a better idea of the type of topics that these sources suggest, we will discuss a few examples which have appeared in reports of what various schools have attempted to offer. The topics listed are confined to the subjects of algebra and geometry and space allows only the briefest indication of the nature and importance of each one. The ways in which these supplementary topics may be related to the standard content will be discussed in more detail later.

Some enrichment topics in algebra currently being used by various schools are:

1. *Linear functions.* This familiar topic may be approached differently by using some new ideas of sets, relations, and functions. A linear function may be defined as the solution set of ordered pairs (x, y) for the equation $y = ax + b$ in the domain of real numbers and $a \neq 0$. The graph of this solution set is a straight line. The delta notation (Δ) may be used so that Δx denotes the change in x and Δy a change in y . This leads to defining the slope of the line or rate of change of the function as $\Delta y / \Delta x$, thereby laying a foundation for a later study of calculus. The roles of 'a' and 'b' in the linear equation may be investigated.

2. *Determinants.* For real numbers, the expression $a_1 b_2 - a_2 b_1$ may be written as $\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}$, which is called a second-order determinant. Simple rules may be developed for solving a pair of simultaneous linear equations in two unknowns using these second-order determinants. Later an extension may be made to solve three simultaneous linear equations in three unknowns using third-order determinants.

3. *Topics from theory of equations.*

a. Division of polynomials, including synthetic division in which only the detached coefficients of the polynomials are used.

b. Development and use of the remainder theorem which facilitates the computation of the value of a polynomial for an assigned value of x . Let r be the assigned value of x for the polynomial $f(x)$. If the polynomial $f(x)$ is divided by $x - r$, then the constant remainder is the value of the polynomial, $f(r)$. This is known as the remainder theorem. The constant remainder is zero if and only if $x - r$ is a factor of the polynomial $f(x)$. This is called the factor theorem.

c. Some elementary methods of isolating roots of polynomial equations. For example, if a polynomial equation with integral coefficients $a_0 + a_1 x + \dots + a_n x^n = 0$ has a rational root r/s reduced to lowest terms, then r is a divisor of a_0 and s is a divisor of a_n . Also, if the coefficients of a polynomial equation $f(x) = 0$ are real, and if a and b are real numbers such that $f(a)$ and $f(b)$ have opposite signs, then the equation has at least one real root between a and b . This serves as a basis for approximating roots of equations when the interval between a and b is decreased as in Horner's method.

4. *Minimum and maximum values of quadratic functions.* Finding these values can be done with high school algebra by using the symmetry of the function or by completing the square. This begins to establish the minimum—maximum concept for later use in calculus.

5. *Introductory probability concepts.* Through dice throwing, bead drawing, and other similar finite situations, some elementary probability con-

cepts may be intuitively developed, such as sample spaces and probabilities of independent, complementary, mutually exclusive, and conditional events. The binomial theorem, which is commonly taught in high school, can be developed from the laws of chance for repeated trials. Permutations and combinations are also taught in high school and can be related to probability.

6. *Topics from number theory.*

a. Congruence and modulo number systems. Integers a and b are congruent modulo integer k if and only if k is a divisor of the difference between a and b . For example, 23 is congruent to 58 modulo 5. This congruence relation is useful in the study of some properties of integers and can be used to establish modulo number systems.

b. Factoring and primes. For each integer a , b , c , if $a \cdot b = c$, then a and b are called factors of c . If a positive integer has only itself and 1 as factors, then it is called a prime. This leads to finding prime factorization of integers, greatest common divisors, and least common multiples. Some simple theorems can be developed, such as for integers x , y , z , if z is a factor of x , and z is a factor of y , then z is a factor of $x + y$. Also a method for finding greatest common divisors can be developed such as the euclidean algorithm.

c. Tests of divisibility. Through exploratory work, short cuts may be developed to determine by inspection whether an integer is divisible by integer from 2 through 9. After the divisibility tests have been conjectured, some informal proofs may be provided.

7. *Descriptive statistics.* This can include the organization of data, measures of central tendency such as the arithmetic mean and median, and measures of variation as the standard deviation and quartile deviation. The origins and uses of these measures may be explored. Also the uses and properties of the summation operator Σ may be developed.

8. *Historical origins of algebraic concepts and notation.* The historical evolution of present-day notation and concepts provides an interesting library project and helps to deepen understandings.

The following list consists of some enrichment topics in geometry which have been currently suggested by several teachers of mathematics.

1. *Extensions of statements in plane geometry to solid geometry.* For example,

In plane geometry:

- a. Two lines can only intersect at one point.
- b. For each two points, only one line can contain them.

In solid geometry:

- a. Two planes can only intersect at one line.
- b. For each two lines, only one plane can contain them.

2. *Originals.* These are the exercises which involve more intricate geometric relationships and often require a great deal of insight to solve.

3. *More difficult constructions.* Some restrictions may be placed upon the use of the straightedge and compass, and the students can determine if any limitations result in the performance of the usual geometric constructions. For example, the modern compass which retains its opening when lifted from the paper and may be used as a divider for transferring distances, can be replaced by a euclidean compass which collapses when lifted from the paper. Also the straightedge may be discarded, and all constructions attempted by the compass alone. The latter type is called Mascheroni constructions. This can show that all the geometric constructions performable by the use of straightedge and modern compass can also be performed by the compass alone, or by the straightedge and euclidean compass.

4. *Some famous historical problems and paradoxes.* These include trisecting angles, squaring circles, and doubling cubes. The challenge lies in establishing an algebraic criterion of euclidean constructibility.

5. *Non-euclidean geometries.* A non-euclidean geometry is developed from a modification of the euclidean axioms. Historically, the explosive revolution of modern mathematics began with the development of these geometries. An informal discussion of such geometries is an important supplement to a study of euclidean geometry. It would show effectively that a mathematical system is independent of intuitive content and is not bound by self-evident truths. The geometry of the surface of a sphere is a non-euclidean geometry which is within easy grasp for the gifted students.

6. *Coordinate geometry.* A one-to-one correspondence may be established between points in a geometric plane and ordered pairs of real numbers. This enables geometric statements and concepts to be interpreted algebraically. Proofs of some theorems, such as those concerning medians of triangles, are more easily accomplished algebraically than geometrically. This approach also provides an excellent basis for a later study of analytic geometry.

7. *Conic sections.* The study of the circle may include the fact it is a special intersection of a plane and a right circular cone. Other conic sections can be described, such as ellipses, hyperbolas, and parabolas. The historical development and use of the properties of conics provides a fascinating study. Conics may be studied from various aspects. They may be studied metrically in terms of their foci, algebraically in the form of graphs of second-degree equations, and projectively as projections of a circle onto a plane. The simplicity and beauty of the projective properties of conics make them a very desirable study for gifted students.

8. *Elements of deductive logic.* Logic provides a basis for organizing mathematical knowledge and is useful as a means for efficient exposition. Although this topic should be woven into all mathematical text material, some formal presentation of elementary symbolic logic would be a worth-

while supplementary activity for the gifted students. This could include such matters as: constants and variables, connectives (*and, or, not, if-then*), variations of the conditional, and some commonly used inference schemes.

9. *Finite geometric systems.* A finite geometry is one in which the lines contain a finite number of points. These systems can be developed from a few postulates. They provide an excellent source for exploring a simple deductive system and for studying the distinction between a theory and its interpretation.

These are but a few of the possible enrichment topics; however, they provide some idea of what is being attempted by many schools. It is rather significant that many of the topics listed above are becoming part of the standard program in many of the schools.

Ways of Relating Supplementary Material to Standard Topics

The extended topics may be related to the conventional topics in a number of ways. Some of these methods are discussed briefly below. Examples are drawn from the list of topics just presented.

Supplementary material may be based upon a deeper exploration of the interrelationship of the concepts studied. Several topics of secondary school mathematics are readily adaptable to this deeper probing. In many sections of plane geometry, problems which are called "originals" essentially involve the more subtle relationships of complicated geometric figures. In supplementary material of this type, one can make a more searching analysis for gifted students into the finer and more subtle relationships within a topic than one makes in conventional developments of the topic.

Supplementary topics may also be derived from introducing a new definition with new notation, which is based upon concepts just studied, and then see what unfolds. A good example of this form of extension is the development of determinants to solve simultaneous linear equations in two and possibly three unknowns. There the definition of a determinant is provided, and then its use in solving these equations is developed. Another example is the introduction of the delta notation for the rate of change concept in linear equations as a prelude to a later study of calculus. Actually, this form of extension should be the basis for the development and study of all mathematics, and it should be the type of extension found in the main sequence of the program as well as in the supplementary sequences. Consequently, the supplementary sequences of this type are based upon new definitions and notation which are not vital to the development of the main sequence but do add to deeper understanding of the topics in the main development.

Another form of supplementary material for the gifted is derived from

looking at the conventional topics from different viewpoints and orientations. Areas may be viewed as generated by a moving-variable line segment and volume as generated by a moving area.* Graphs may be developed more generally as pictures of sets of ordered pairs which satisfy a certain relation, and functions as a special type of relation. Trigonometric functions may be defined as mappings of the real numbers on a unit circle instead of as being confined to relations of sides of right triangles. Integers may be developed as ordered pairs of natural numbers and rational numbers developed as ordered pairs of integers. Equations and inequations may be considered as open sentences, and their roots as elements of the solution sets of these equations and inequations.

Actually, the above examples are a small indication of a major revolution in mathematics which has been going on for the past 50 years. One of the essential features of this revolution has been the development of some fundamental concepts such as ordered pairs, sets, and relations which have been found to be quite powerful in the study of mathematical systems. The development of the conventional topics from a more modern mathematical viewpoint using these fundamental concepts provides excellent supplementary material for the gifted students, and probably in the near future this modern mathematical approach will become conventional instead of being supplementary because of its potential pedagogical value in facilitating the learning of mathematics. In the meantime, during the transition, supplementary material with this orientation can be used to good advantage. Some examples with a great deal more detail will be provided in a later section of this chapter.

Another type of extension from conventional topics consists of studying mathematical systems that behave exactly like the system being studied or which are slightly different in some respect. In modern abstract algebra, two mathematical systems which behave exactly alike are called isomorphic. Usually some systems are available or can be developed which are isomorphic to the one being currently studied. In the study of logarithms to base 10, for example, one can develop logarithms to another base and show that the new logarithms can work equally well as the original ones. Polynomials can be studied from the standpoint that they are isomorphic to the integers and also that the polynomials behave the same way as our positional numeral system. The integers modulo a prime are structurally the same as the rational numbers except for the order relation. A finite geometric system can be developed from certain axioms of euclidean geometry, and, of course, the non-euclidean geometries were developed from a variation of the parallel postulate.

* H. F. Fehr, *Secondary Mathematics* (Boston: D. C. Heath and Co., 1951), chap. I.

Supplementary material of this type is excellent for developing deeper understanding and for broadening the meaning of the standard mathematical topics. The structure of the system under study is made much more pronounced when another system is examined which has an identical structure or at least a very similar structure. This type of material can obviously be used to stimulate the gifted student to create and compare other systems.

Conventional topics may also be extended by investigating their historical origins. This is a popular form of supplementary material; however, it can become superficial or lacking in challenge for the gifted student. To avoid superficiality, students can tackle problems that have led to the origin of mathematical concepts and then study some of the blind alleys that were encountered by the originators. Many historical mathematical paradoxes challenged the early mathematicians, and even though some of the problems and paradoxes were never solved, the study of them led to some very important mathematical developments.

These are some of the ways in which the topics of a conventional mathematical program can be extended to provide challenging and enriching supplementary material for the gifted student. The choice of the method depends mostly upon the nature of the topic being studied and the mathematical maturity of the students. For example, a mathematical system should be fully developed before it is compared with an isomorphic system or another system which is only slightly different in structure. It would probably be better to study the deeper and finer relationship of an incompletely developed topic.

Some of the above ways for extending mathematical topics are of recent origin, reflecting the impact of the modern viewpoint of mathematics, and are not currently in wide-spread use. This particularly refers to the methods of introducing new definitions and notations and of exploring systems which are structurally the same or nearly the same. These methods will be elaborated in the later section on proposals for creative mathematics. The most traditional supplementary material consists of deeper probings of the topics and study of the historical origins of the topics.

Some Enrichment Procedures

At this point, we shall consider some procedures commonly used by secondary schools for enriching the program of the superior student. A survey of the junior and senior high schools of Minneapolis determined what provisions were being made for the mathematically talented students.⁷ Some of the enrichment procedures reported are.

⁷ H. O. Jackson, "The Superior Student in Mathematics," *The Mathematics Teacher*, Vol. 52, No. 3, March 1959, pp. 202-204.

Doing library research work
Reading for interest or recreation
Writing book reports
Solving additional and more difficult problems
Investigating topics of special interest
Making models
Preparing exhibits for science fairs
Making scrapbooks
Watching and reporting on mathematics television programs
Organizing and conducting meetings of a mathematics club
Preparing lessons to teach to classes
Conducting class discussions
Writing mathematics term papers
Meeting in groups to review for college entrance examinations
Competing in the national mathematics contest
Attending special Saturday morning classes at the University of Minnesota

This list is fairly typical of enrichment activities for the gifted student. Generally speaking, these activities take the form of assigning supplementary problems, encouraging special reading, guiding study of special projects, and stimulating activity in clubs and class demonstrations.*

Evaluation of Enrichment Practices

We must now evaluate the use of supplementary enrichment material for the mathematically gifted student. Both forms of supplementary mathematical material discussed thus far, namely, extended applications of mathematics and extended topics in mathematics, must be examined.

Most of the difficulties and limitations in the use of enrichment stem from the problem of ensuring that the supplementary material is related to the main stream of the program. The main purpose of the enrichment material is to broaden and deepen the student's understanding of the standard mathematical topics. This means that this material should extend but pertain to the conventional material of the mathematics program. Relating supplementary material to conventional material has already been discussed. But the problem of relating the applications of the conventional topics of mathematics to the main program is equally important and has received less attention. The extended applications can easily become involved in non-mathematical considerations and become quite irrelevant to the mathematical topics under study.

Relevant material is often difficult to find in the variety of sources listed in the preceding section and is seldom conveniently placed in the

*Pat S. Jorgensen, "Enrichment of the Mathematics Curriculum for the Superior High School Student" (Master's thesis, Sacramento State College, 1957).

textbook being used. After the material is found, the teacher must make certain that it is properly keyed in with the topic under study. The content should be checked for reading level and vocabulary and for appropriate notation. Making certain that the supplementary material is pertinent to the topic being studied requires considerable work on the part of the teacher unless it has already been properly prepared.

Closely related to the relevance problem is the matter of gifted students feeling that the supplementary material is simply extra work. This can be especially true if the material is not particularly relevant. If, however, the enrichment material is pertinent to the topical sequence and enhances understandings of the main development, then gifted students will be properly motivated. The teacher's investment of extra time in carefully relating the supplementary work to the main development will result in student interest and help to overcome this problem.

If the problems of the relevance of the supplementary material and of the motivation of the gifted students are satisfactorily solved, then the use of enrichment material to stimulate the gifted student is a very worthwhile practice. By using enrichment material, the teacher can provide for the bright student in the regular classroom, which is a factor very important to the smaller schools. Furthermore, this procedure is pedagogically sound in that it provides for deeper understandings and more challenge for the individual.

Combination of Enrichment and Acceleration

In our analysis of current curriculum practices for the gifted, we have discussed separately the practices of acceleration and enrichment. As was pointed out earlier, most school programs for the mathematically talented students combine the features of both these procedures. In other words, the conventional sequence may be accelerated for the bright student and at the same time some enrichment material may be provided at appropriate times.

Current practice in providing for the gifted student nearly always leaves the formalized nature of mathematics essentially intact. Acceleration simply speeds up the study of the formalized mathematics and enrichment supplements the formalized program. Challenge is provided by forcing the gifted student to find his own short cuts and to organize when confronted by a mass of formalized material presented at a rapid pace, or by introducing the student to challenging applications of the formalized material.

We do not take the point of view here that current practice in providing for the gifted student is invalid. Too many persons who are products of these programs have gone on to become eminently successful mathematicians, scientists, and engineers. Our position is, however, that current

curriculum programs in mathematics can be greatly improved by incorporating the modern viewpoint of mathematics into the program in such a way that the formalized nature of mathematics can be considerably diminished. We would agree with Descartes that an overemphasis on the formalized aspects of mathematics can and does dissuade many gifted students from pursuing mathematics further. Therefore, any effort to make the study of mathematics more adaptable to the creative powers of the gifted students would probably be rewarded in terms of more gifted students pursuing and enjoying the study of mathematics.

SOME PROPOSALS FOR CREATIVE MATHEMATICS

Let us clarify at the outset that creativity cannot be guaranteed by any proposed curricular procedure or content. Human creativity is too complex a phenomenon to be placed in any simple stimulus-response situation. All that can be hoped for on the part of teachers and school administrators is that situations can be developed which stimulate creativity on the part of the academically talented students.

The term "creativity" is used here in a restricted sense. At the secondary school level of mathematical maturity, even the most capable student cannot be expected to create new mathematics at the frontier of knowledge. We are using "creativity" in the context of a student creating mathematical knowledge for himself. In other words, we would hope to stimulate a creative study of mathematics on the part of the gifted students. Perhaps a better term to use here is "discovery," although it is not our intention here to get involved in a philosophical discussion on this distinction.

Previous mention has been made in this chapter of the problem of overcoming the formalized character of elementary mathematics in providing for creativity in mathematics. Recently, a group of educators, especially competent in mathematics, indicated what they believe to be two alternatives to the problem:

There is underway in the country a serious and fundamental reconsideration of the mathematics curriculum that in a sense, transcends our immediate problem of provisions for the talented. Some schools will want to tie their program of making provisions for the talented to a reorganization of the whole school program in mathematics. Other schools will continue a basically traditional program and will seek to make provisions for the talented within its framework.⁹

The nationwide reconsideration of the mathematics curriculum referred to by this group of mathematics educators is primarily due to the impact of

⁹J. W. Ilavsky, ed., *Mathematics for the Academically Talented Student* (Washington, D.C.: N.E.A. and The National Council of Teachers of Mathematics, 1959), p. 22.

the modern view of mathematics. The second of their alternatives in which schools maintain a basically traditional program and provide for the talented with supplementary material has already been outlined in this chapter. The proposals for creative mathematics in the remaining section of this chapter shall be related to their first alternative in which provisions for the talented are in line with the reorganization trend, suggested by a number of study groups.¹⁰ Our point of view here is that the formalized procedures and sequence should not be the dominating feature of mathematics and need not remain intact. Consequently, our proposals demonstrate how the modern viewpoint of mathematics can be used to modify the highly formal and mechanical character of mathematics and thus make room for some creativity and discovery in the study of mathematics.

An outline of a complete high school program in mathematics for the gifted will not be developed. This would be both impossible and presumptuous in light of the present fluid state of experimental programs and of the necessarily flexible programs which need to be offered to the gifted. We shall simply offer a few proposals which indicate what might be done for the gifted. These shall be presented as outcomes of various approaches which may be used to develop a program for the gifted.¹¹

The following categories serve to classify the proposed examples:

1. The first approach consists of offering only primitive definitions from which a student may create or discover short cuts and refinements of method.

2. The second development for cultivating a creative study of mathematics is to describe briefly an application situation. The student is then called upon to develop mathematical notation for the elements of the phenomenon under study and subsequently to describe mathematically the interrelationships among the elements.

3. The third method is to present a skeleton structure of a mathematical system which is left for the student to fill in. This approach is somewhat similar to the primitive definitions except that more is offered in the way of suggestions and directions to the student. The student's knowledge of logic can be used to fill in the structure by examining and testing a variety of sentences which are derived from logical interrelationships.

4. *The fourth means for developing a creative study of mathematics is*

¹⁰ See bibliography for names of these groups.

¹¹ In developing the proposals for the content of creative mathematics, the author wishes to acknowledge the influence of the University of Illinois Project in Mathematics under the direction of Max Beberman. This project has been experimenting for several years with various approaches for encouraging a creative study of mathematics on the part of students. The author has also found helpful some proposals made by various study groups such as the Commission on Mathematics of the College Entrance Board.

to encourage students to modify a system being studied by changing a definition or a postulate slightly and then investigating the consequences and making comparisons with the original system. Likewise, the student can be encouraged to develop systems isomorphic to the original system through changing notation and definitions, thereby bringing into sharper relief the structural ideas of the original system.

5. The fifth and final approach consists of introducing students to some particular examples of the way certain elements of a system behave or are related, and then having the students generalize and relate their generalizations to the structure of the system being studied.

Some examples of these approaches are presented below. Note that the concepts are not developed here as they would be presented to students. The proposals consist only of an outline of the essential ideas.

Primitive Definitions Approach

Example 1. The topic under study is some elementary transformations of algebraic expressions, often called simplification. For instance, the expression $3x + 2 - 6x + 3 + 4x$ can be transformed into the equivalent expression $x + 5$, which is simpler looking.

We assume that the student has had some background in the purpose and use of variables and of expressions which contain variables (open expressions) and the basic rules for substituting for variables. Hence, the student has had previous experience in using open expressions to generate numerical instances and in formulating open expressions from numerical instances. Furthermore, it is presumed that the student has had some exploratory experience with numerical instances of such principles as the commutative, associative, and distributive principles and with the behavior of identity elements.

With the stage thus set, the following basic or primitive definition is presented to the student:

Definition: Equivalent algebraic expressions are those expressions which have the same value for the same numerical substitution of the variables in each of the expressions.

If two expressions are equivalent, then we can indicate this by connecting the two expressions with an equal sign (\equiv). Since in the example above the two expressions are equivalent, we can indicate this as follows:

$$3x + 2 - 6x + 3 + 4x \equiv x + 5$$

The student is now left to his own devices with possibly some limited teacher guidance to develop procedures and short cuts for simplifying expressions. He might explore pairs of open expressions as follows:

$$\begin{array}{l}
 3a + 4b \text{ and } 7ab \\
 3a + 4b \text{ and } 7a + b \\
 4x + 3x \text{ and } 7xx \\
 3a + 2a \text{ and } 5a \\
 3ab + 2ab \text{ and } 5ab \\
 3xy + 3xz \text{ and } 3x(y + z)
 \end{array}$$

From these and other examples, the student may discover a very important transformation principle.

Other pairs of expressions involving subtraction and negatives or opposites can similarly be explored, such as follows:

$$\begin{array}{l}
 -(a - b) \text{ and } (b - a) \\
 -(a - b) \text{ and } (a + b) \\
 x - (y + z) \text{ and } x - y + z \\
 x - (y + z) \text{ and } x - y - z \\
 x - a - (y - a) \text{ and } x - y \\
 x - a - (y - a) \text{ and } x + y
 \end{array}$$

Again, from these and other explorations, the student may develop for himself some transformation principles and manipulative short cuts which he can use in simplifying such expressions as.

$$-3(6 - 2a - 3b) - 4(3 - 4a - 2b) - (3a - 2b)$$

Further explorations could be made of expressions involving division through considering such pairs of expressions as:

$$\begin{array}{l}
 \frac{a}{b} + \frac{c}{b} \text{ and } \frac{a + c}{b + b} \\
 \frac{a}{b} + \frac{c}{b} \text{ and } \frac{a + c}{b} \\
 \frac{a}{b} + \frac{c}{d} \text{ and } \frac{a + c}{bd} \\
 \frac{a}{b} + \frac{c}{d} \text{ and } \frac{ad + bc}{bd} \\
 a + \frac{b}{d} \text{ and } \frac{a + b}{d}
 \end{array}$$

Consideration of these and many other pairs of expressions will lead to principles which the student may use in simplifying such expressions as:

$$\frac{2a}{a + 3} - \frac{5a}{a + 6} - \frac{3a}{a + 3}$$

The student is thus encouraged to develop for himself the transformation principles and manipulative short cuts that are useful in transforming expressions into simpler form. As the student explores, he has the primitive definition available to test his conjectures. Usually, most of his proposed ideas for transformation principles can be discarded after a simple numerical substitution shows that the expressions are not equivalent. The student's previous exploratory experience with numerical instances of some principles should, of course, be quite helpful here.

Example 2. The topic under consideration is the familiar one in algebra of solving equations.

The student up to this point has had the experience of developing principles and techniques for transforming one expression into an equivalent expression which is simpler looking, such as just described in example 1. Now the student is introduced to open sentences such as:

$$\begin{aligned} 3x + 5 &= 26 \\ 7x + 4 - 3x &= 15 - 2 \end{aligned}$$

These open sentences are called identity sentences or equations.

The solution set of an equation is defined as the set of all numbers of a given domain which convert the equation into a true sentence. These numbers are said to satisfy an equation and are often called *roots*. The student can find by trial and error the roots of such simple equations as:

$$\begin{aligned} 4x + 17 &= 41 \\ 3x + 2 - x &= 3 - 7 \\ 2(x + 3) &= 5 \end{aligned}$$

When more difficult equations are encountered, the student is ready to consider more effective ways of finding the roots or solving equations. At this point, the following primitive definition is introduced:

Definition: Two equations are equivalent when they have the same roots or solution set.

This definition now provides a basic test for exploring ways of transforming a more difficult equation into an equivalent one which is easier to solve.

Consider, for instance, the equation $7x + 4 = 16 - 3x$. The student might explore the following equations to see if they are equivalent:

Original equation: $7x + 4 = 16 - 3x$

Proposed equivalent equations:

- (1) $[7x + 4] - 4 = [16 - 3x] + 3x$
- (2) $[7x + 4] + x = [16 - 3x] + x$
- (3) $[7x + 4] + 5 = [16 - 3x] + 5$
- (4) $[7x + 4] - 3 = [16 - 3x] - 3$
- (5) $[7x + 4] + 3x = [16 - 3x] + 3x$

then it will become apparent that this principle will need to be modified to exclude multiplication by zero.

Many other examples of the primitive definition approach could be provided. The two examples just provided, however, should be sufficient for one to identify some essential characteristics of this approach.

The definition is so basic and primitive that it is of limited use. It invariably involves trial and error procedures which are quite inefficient. Yet the definition is one which is intuitively obvious and readily acceptable to the student. Furthermore, it is sufficient to provide a check on exploratory experience. In other words, the definition is sufficient to provide a basis upon which to reject or accept as plausible a hunch or conjecture of the student. Ordinarily, during the exploratory stage, a student will consider several erroneous proposals, and these can be quickly rejected by a counter-example based upon the definition.

Since the primitive definition involves inefficient trial and error procedures, the student is strongly motivated to find more efficient procedures. He uses his own ideas for exploration, and he has a personal ownership of those ideas which are successful. This approach can be quite self-propelling especially for the gifted. There is a great deal of flexibility as to the amount of guidance and direction necessary for the student; probably very little guidance is necessary for the talented student. Also, this approach allows for flexibility as to depth of complexity of the exploration. One can readily see that this allows the talented student to exert his full creative and imaginative powers.

The two examples were deliberately chosen from an area in which it is generally believed that any creative study is nearly impossible. The general practice is to provide the students with rules for simplifying expressions and solving equations and then having them mechanically apply the rules to scores of exercises. Thus we see that the primitive definition approach is particularly applicable for providing a creative study of mathematical topics in which mechanical manipulation plays an important role.¹²

Application Situation Approach

The next approach toward a creative study of mathematics involves the applications or interpretations of mathematics. There are two phases of this approach: The first is the use of application situations or interpretations as a basis for developing the study of a mathematical system. The

¹² The primitive definition approach was developed and is being used successfully by the Project in Mathematics at the University of Illinois (UICSM). A full explanation of this development can be found in the first four units of their text materials. (University of Illinois Committee on School Mathematics, *Units I, II, III, IV*. Urbana: University of Illinois Press, 1959).

second is the exploration and development of application situations which make use of mathematical systems already studied.

Example 1. The topic under consideration is the arithmetic of integers. Such numbers as $+5$, -3 , $+17$ are integers and quite often they are called signed numbers or directed numbers. The student begins a study of the arithmetic of integers usually just prior to a study of algebra.

The student is introduced first to a physical interpretation of the integers and from this interpretation he derives a meaningful guide for carrying out the operations with integers. For the addition of integers, each integer may be interpreted as travelling east or west a certain number of miles, and addition may be interpreted as the combination of two trips. Thus, the integer $+2$ is interpreted as a trip of two miles to the east and -5 is interpreted as a trip of five miles to the west. The combination of these two trips results in a trip of three miles to the west, and this fact would be expressed as $(+2) + (-5) = (-3)$. Many other such combinations can be explored. Note, however, that the addition combinations of integers must reflect the facts of the application situation; in this manner the interpretation serves as a guide to the student in his examination of various addition combinations of integers.

Other interpretations are equally adequate for developing the addition of integers. For example each integer may be interpreted as a debit or credit, or as an asset or liability of a certain number of dollars. Thus, $(+2) + (-5)$ would be interpreted as a combination of a two dollar credit and a five dollar debit. In a similar manner, each integer may be represented by a drawing of a directed line segment of certain length.

For multiplication of integers, a useful interpretation is a pump and a tank of water. The pump can either pump water into or out of the tank at a certain rate of gallons per minute. Thus, -3 is interpreted as pumping out of the tank at the rate of three gallons per minute and $+3$ as pumping into the tank at the rate of three gallons per minute. The amount of time in which the pump is operating is measured into the future and into the past a certain number of minutes. Thus, $+5$ is interpreted as five minutes into the future and -5 as five minutes into the past for the operation of the pump. If water is being pumped out of the tank at a rate of three gallons per minute and the time is five minutes into the future, then there is a decrease in the volume of the water in the tank of 15 gallons. This is represented as $(-3) \times (+5) = (-15)$.

The student is provided with no rules for operating with integers, and he works out his own procedures using the physical interpretation as a guide. The physical interpretation serves the same purpose as the primitive definition in providing a basic guide for exploration.

Example 2. The topic under consideration is permutations. A permutation can be defined technically as a mapping of a set of elements onto itself.

Nontechnically, a permutation may be thought of as one of a number of arrangements of elements of a set. For instance, suppose that we consider three elements a, b, c . We could list the permutations of these three elements as follows:

a, b, c	b, a, c	c, b, a
a, c, b	b, c, a	c, a, b

A study of permutations is a necessary requisite for a study of probability theory and would be a very appropriate topic in the junior or senior year of high school.

The student is introduced to a study of permutations by considering the following application situation. Suppose a jeweler has on display in his store window a mantle clock, a silver plate, and a diamond necklace, and for reasons of his own would have his employee each morning shift the positions of these display items. He might, for example, instruct his employee to put the clock in the place of the plate, the plate in the place of the necklace, and the necklace in the place of the clock. The next morning he may direct the employee to leave the clock alone, and to interchange the positions of the plate and necklace.

Since these instructions come regularly every morning, and since they become quite wordy, the student is asked to provide a convenient and precise notation which the jeweler could use in giving instructions. This would require a naming of each of the permutations in some convenient manner. From this stage, a situation could be presented where the employee is required to combine two permutations and determine the resulting permutation. This necessitates signifying an operation and determining the results of this operation for all pairs of permutations. A mathematical system is beginning to unfold, and the student can now devote his attention to the system itself and to uncovering some properties of this system.

Other application situations could be used to develop this system which are just as adequate as the one presented above. For instance, a cardboard square with lettered vertices could be used in which each permutation is represented by a particular rotation of the square.

Example 3. The topic for this example is the application of some elementary coordinate geometry to the study of coplanar force systems. It is assumed that the student has mastered the basic elements of coordinate geometry and is now ready to explore some physical interpretations.

The student is introduced descriptively to the concept of a force and its action on a rigid body and to some simplifying assumptions which will make the analysis easier at the start. He is led to the idea that since a force has two aspects, magnitude and direction, it will be necessary to represent mathematically a force by an ordered pair. Symbolizing a force and determining the domain of each component of the ordered pair or vector is

left to the student. The simplest situation is considered first, where a two-dimensional coordinate system can be imposed on a flat, rigid body of constant and homogeneous thickness and the forces are coplanar and concurrent at the origin of the coordinate system. This brings up the fact that these forces must be idealized so that they can act at a point and have a line of action. With these simplifying assumptions, which should be thoroughly discussed, the student begins to explore the combination of some concurrent coplanar forces into a single force. He also explores doubling, tripling, or halving the magnitude of forces which introduces the operation of scalar multiplication on the two dimensional vectors.

After concurrent force systems have been thoroughly explored, non-concurrent coplanar forces may be studied. This will involve some consideration of moments of forces, their ordered pair or vector representation, and their combination. Also some study will have to be given to the translation of a force along its line of action. After further investigation, it becomes apparent that all coplanar force systems can be reduced to a moment and a force. This provides a basis for a definition of equilibrium. If desired, three dimensions and distributed forces can then be explored.

The creative element in this method of presentation comes primarily from the student developing the necessary idealizations and symbolizations so that the mathematical system which he has just studied can be applied. So often in most texts, these idealizations and symbolizations are provided for the student, and all that is left is the mathematical computation of a predicted result. This forfeits much of the challenge which could come from confronting the talented student with a particular phenomenon for which he must develop the necessary simplifying assumptions and appropriate notation. It is important to choose a phenomenon for application in which the student has some basic intuitive knowledge that can be easily supplemented by precise description and perhaps some empirical data. This is necessary so that the primary concern will be with the mathematical applications.

Skeletal Structure Approach

The next approach for a creative study of mathematics involves presenting an outline of the structure of a mathematical system and having the student fill in the gaps.

Example 1. The following postulates are presented.

- I. A line is a set of points and contains at least two points.
- II. There are at least three points which are non-collinear.
- III. For each two points one and only one line contains them.
- IV. For each three lines a , b , and c , if a is parallel to b and b is parallel to c , then a is parallel to c .

Definition: Two lines are parallel if and only if their intersection is empty.

Some of the theorems which can be deduced from these postulates are as follows:

1. Two lines intersect in at most one point.
2. For each point, at least two lines contain it.
3. For each line L and each point P , only one line contains P and is parallel to L .

The proofs for these theorems are left to the student, and he may create other sentences to see if they can be derived from the postulates. The development of other sentences to be tested as possible theorems may be done in a number of ways, depending upon the ingenuity of the student. In the existing postulates and theorems, the terms "point" and "line" may be interchanged to produce new sentences for checking. This is checking a property called "duality" in mathematics. Also, the student may just simply raise some questions such as:

1. Can a line be parallel to itself? (The answer is no, and hence, this can be stated and proved.)
2. Since there are three points which are non-collinear (Postulate II), are there three lines which are non-concurrent? (The answer is yes.)
3. Suppose there is a line which contains three points, what conclusions can be drawn?

The student may also use his knowledge of plane geometry to develop sentences for checking. For instance, the student might want to check the following sentences which hold in plane geometry:

1. For each line L and each point P not on L , there is at least one line which contains P and is parallel to L .
2. If two lines are parallel and if a third line intersects one of them, then it will intersect the other parallel line.

The second sentence is a theorem; however, the first sentence is not derivable from the postulates. This brings up the problem of how to show that a sentence is not deducible from a set of postulates and introduces the idea of developing models or interpretations for which some proposed sentences are false.

Several possible theorems may be developed, depending upon the student's ingenuity; therefore, he has an opportunity to explore a rather simple deductive system quite thoroughly and to come up with a much richer understanding of the nature of a deductive system.

Modification and Analogy Approach

The fourth approach involves modifying a definition or postulate of a system being studied and seeing what the consequences are. Also, this

$$(8,20) \cdot [8,20] = 4 \cdot 40 = 160 \text{ and } 8 \cdot 20 = 160$$

$$(16,6) \cdot [16,6] = 2 \cdot 48 = 96 \text{ and } 16 \cdot 6 = 96$$

It looks as though we might have found a general pattern which could be expressed as follows:

For each pair of positive integers a and b , $(a,b) \cdot [a,b] = a \cdot b$

Many other such general results can be found by making inductions from particular cases. The student could pursue this further by developing formal definitions for highest common factors and least common multiples, and then proceed to prove the generalizations which he had developed from the induction approach.

Before going any further, let us make some general observations regarding these illustrations. In the first place, these proposals are by no means mutually exclusive. They are variations of a theme, and the main theme is: what is the least amount of thought-provoking material which will start the student on his creative or discovery process. The key words are "explore" and "develop," and it is hoped that from these a chain reaction of exploration will start.

In presenting these examples for cultivating a creative study of mathematics, our intention here is not to imply that drill exercises are not needed to develop manipulative skill. On the contrary, we hope that these proposals will be helpful in providing a more efficient basis for developing manipulative skill with mathematical expressions. The confidence and security which comes with such skill is a very desirable thing, especially in later study of mathematics where manipulative skill will permit the student to give more attention to the new concepts being studied than would be allowed if he were struggling along with manipulations that should have been mastered earlier.

We do contend here that the development of a skill in manipulating mathematical expressions and a study of formalized mathematical material need *not* be the overriding feature of mathematical instruction. Some allowance for creativity and discovery can be made in the main sequence of topics because each topic is surely susceptible to at least one of the proposed approaches for a creative study of mathematics. The gifted student should not have to find creative experience outside of the main mathematical sequence.

IMPLICATIONS FOR FUTURE

Mention has already been made of the current national concern regarding the curriculum of high school mathematics. Experimental

projects, study and writing groups, and various committees and commissions involving teams of mathematicians and competent teachers are in operation throughout the country. These groups are developing materials for experimental use in the classrooms. The mathematicians on these teams are providing a long-needed examination of the content of secondary school mathematics from the standpoint of the contemporary view of mathematics and the nature of current mathematical activity. They are finding generally that the present topical sequence is fundamentally sound and needs only some changes in the amounts of time devoted to some of these topics.

Most of these mathematicians are finding, however, that the usual treatment of these topics needs some rather drastic overhauling in order to bring the material more in line with the contemporary view of the nature and role of mathematics. Mathematics has been found to be the ideal model of logical discourse and of organizing knowledge. A great deal of study has gone into the structures of mathematical systems and into the relationships of these structures, and this has had a profound effect upon the applications of mathematics.

In the past, mathematicians were interested primarily in developing special and ingenious techniques for solving problems. Today, the mathematician must also solve particular problems with special techniques, but his primary concern is the broader context that is involved. He begins to generalize by examining both the application situation which gave rise to the problem and by looking more closely at the method or technique developed. In examining the application situation, he attempts to identify its essential components so that it is easier to determine what other application situations are amenable to this method. In analyzing the method, he studies its structure to determine its scope of applicability, its nature, and its relation to other structures.

The impact of these experimental projects in developing materials for secondary school mathematics which incorporate this enlarged view of the nature and functional role of mathematics will soon be felt in schools throughout the country. This leads to the question of what are the implications of this for curriculum planning for the gifted.

In the transition period, the pioneering of the new developments instigated by the experimental projects can be and should be done in local school systems through their programs for mathematically talented students. There are excellent reasons why this kind of experimentation should be done. In the first place, the program for the gifted should differ essentially only in degree rather than in kind from the programs for other potential college students. The experience of the New York City school system for example, indicates that the optional and enrichment topics for the mathematically gifted later become standard topics in the college-prepara-

tory program of mathematics.¹⁴ In the second place, the new developments toward incorporating the contemporary view of mathematics are particularly slanted toward encouraging a creative study of mathematics, and since this is particularly appealing for the bright students, it should be tried out on them first.

In planning for a creative study of mathematics for the gifted, the teacher naturally plays a crucial role. Only a few teachers have the up-to-date training necessary to carry out such a program. This is certainly not the fault of the teachers; the colleges have only recently started offering courses in mathematics which provide an adequate training. This means that an intensive in-service training program for mathematics teachers must be effected before much progress can be made in planning a creative program for the gifted such as the one just outlined.

Fortunately, the resources of the nation are being mobilized to prepare teachers for the coming changes. The National Science Foundation has underway an extensive institute program throughout the country to prepare teachers to teach mathematics from a contemporary viewpoint. Yearbooks are being produced by national organizations, and texts are being published which are designed to further the teachers' understanding of modern mathematics. Colleges and universities are beginning to understand their responsibilities along these lines and are designing courses which meet the subject-matter needs of teachers of mathematics.

In addition to the preparation of teachers, a creative program for the gifted has pertinent implications for the textbooks and other materials used in the program. For this type of program, the instructional materials need to be considerably less formalized. Fewer rules should be presented in colored rectangles with examples showing applications of the rules, followed by 70 exercises involving the applications of the rules. Teacher presentation should be minimized so that the students will need to read the explanations in the text. Less formal presentation of theorems with neat arrangements of proofs is needed. In other words, there needs to be less presentation in attractive form of material in which all or most of the thinking has been done for the student.

For a program of creative study of mathematics, the instructional material should contain an abundance of exploratory exercises. This material should be carefully prepared so that the student is led toward uncovering principles for himself and is encouraged to do some independent thinking. Consequently, the exploratory exercises should contain a thought-provoking and suggestive sequence which culminates in a blank line for the student to fill in with the important principle or rule which he has discovered

¹⁴ E. P. Vance, ed., *Program Provision for the Mathematically Gifted Student in the Secondary School* (Washington, D.C.: National Council of Teachers of Mathematics, 1957), p. 10

himself. Furthermore, variations of the ideas involved should be suggested which would encourage the student to do some independent exploration. The instructional materials should also contain an abundance of exercises involving the applications of rules and principles, but the principles involved should be the ones which the students have uncovered themselves. Furthermore, these exercises should be constructed so that the student is encouraged to develop further refinement of the principles involved. The instructional material should, of course, emphasize and be guided by the fundamental structural ideas of the mathematical systems being studied.

The need for further research and experimentation in the development of exploratory material is clearly indicated. Formulating suggestive questions and arranging them in a sequence so that most students will follow the lead to an important principle requires a great deal of experimentation. Many facets of this process need to be studied. For example, studies must determine the mathematical content most conducive to this type of development. Experimentation must also ascertain how one may control the subtlety of questions, thereby controlling the gaps in a sequence of questions.

A systematic program must be established to develop adequately the instructional material which will lead to a creative study of mathematics on the part of the gifted students. A team of competent mathematicians, professional educators, and master teachers is needed to write the materials. The experimental use of these materials must be carefully coordinated so that there is full feed-back to the writing team for revision. This process takes several years to produce something significant and effective. Fortunately, some projects in this country have already been established or are being established with sufficient financial backing and competent staff persons for carrying on such experimental work.

SUMMARY

Instruction in secondary school mathematics is commonly conceived as teaching for the mastery of certain basic concepts and manipulative skills. The treatment of topics found in most texts is highly formalized; rules are provided, examples are given which show the applications of the rules, and then the student works exercises which closely approximate the examples.

In planning a program for the mathematically gifted, the problem is essentially one of relating a highly formalized subject to the special capabilities of the gifted student. This is a problem that is not confined to the gifted alone, but because the gifted are especially marked by their creative potential, the problem should be attacked there first.

Conventional solutions to this problem have been basically characterized by two approaches, acceleration and enrichment. Acceleration is essentially a speeded-up covering of existing material, and it offers a direct approach to the problem of boredom for the gifted students. Acceleration also provides immediate help for the gifted because it requires no special preparation for the teachers and no specially designed instructional material. This approach has some rather serious limitations in that coverage of material becomes of prime importance at the expense of opportunity to explore the ideas more deeply and to investigate their implications.

Enrichment has as its primary purpose the broadening and deepening of understanding of the mathematical material being covered. This is generally accomplished through providing the gifted students with additional supplementary material. One type of supplementary material applies interesting applications of the mathematical concepts to problems in such areas as the physical sciences, business and consumer activities, and the social sciences. Another form of enrichment material provides for the study of other mathematical topics which make use of the concepts just studied in the main sequence. Problems which arise from using the enrichment approach, include the pitfall of becoming too involved in the application situations, the problem of finding and relating the supplementary material, and the problem of motivating the students to do extra work. If these problems are overcome, this approach has much to commend it.

Most schools use a combination of two approaches, acceleration and enrichment, in their curriculum planning for the gifted. Yet these two approaches leave the main formalized sequence intact. Acceleration simply speeds it up and enrichment supplements it.

The current national concern regarding the content of the mathematics curriculum of secondary schools is challenging the formalized nature of mathematics instruction. The modern view of mathematics and recent advances in studies of the foundations of mathematics are being used as a basis for formulating a program of creative study of mathematics. In this program, the student uses the set-theoretic language and the structural ideas of abstract algebra to explore and discover the basic principles and the applications of the mathematical systems. The gifted student thus has an opportunity to use his powers in the study of creative mathematics.

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CHAPTER FIVE

Science in the Elementary School

J. STANLEY MARSHALL

One of the bright spots to appear on the educational scene in the past decade is the widespread recognition that children with special abilities have special needs and, following this, that it is the responsibility of the school to set up programs to meet these needs. Nowhere are the needs more critical or the responsibilities more pressing than in the area of science.

The circumstances responsible for this overdue recognition of the needs of the gifted children in science make interesting speculation. The peculiar skills required to design, build, and operate the complex machinery which plays so important a part in most of the things we do has, no doubt, been an important motivating factor. Today we need the talented child in ways in which this nation has not needed him heretofore; or at least the concern was not so apparent a generation ago. Another reason for our belated recognition of our responsibilities to the gifted has been the striking improvement in science education in the past decade. We know more about our children, how and why they learn or do not learn, and what

special tools and techniques help children learn. We have enlisted the aid of psychology and a great variety of sciences in measuring children's capacities and characteristics. As our knowledge of the child population has increased, we have been better able to identify those with special characteristics, and once they are identified, the development of programs to meet their needs is a logical next step.

Still another aspect of mid-twentieth-century education is our concern for the individual. Responsible educators have become increasingly conscious of providing for the needs of *the child*, not just for the needs of children. Quite apart from a desire to improve school programs generally and to insure that society receives the benefits from high quality educational offerings, we have been led to a realization that each child has his own special characteristics which deserve special consideration. This point of view is aptly expressed in the motto of the State University of New York, incorporated in 1948, which states in simple, forceful words: "Let each become all he is capable of being."

IDENTIFYING THE GIFTED IN SCIENCE

Programs for the gifted must necessarily start with some type of identification procedure. Unfortunately, we have no specially sensitive electronic cell which emits electrons in the presence of gifted children, no Gieger Counter to click when they come near. In fact such a machine might present more problems than it could possibly solve.

The school is the agency which claims the major share of the child's time during the formative years; it therefore has the major responsibility for identifying the scientifically gifted. Teachers have opportunities to observe children engage in a variety of tasks and, in this way, to learn a great deal about their abilities. But parents can be helpful in alerting teachers to certain behavior patterns which may help in assessing the child's ability in science. For example, a mother reported to the kindergarten teacher that her son had learned to recognize some fifteen different snakes that he had seen in the woods and fields near his home. He had begun looking them up in books when he was less than five years old. A year later he could recite their names and several facts about each. When the teacher asked if the boy could read, his mother replied, "Only the names of snakes." This six-year-old could, in fact, read the names of most of the native snakes very well; yet his reading did not extend to such words as "run" and "ball." This unusual fact interested the teacher (the boy's parents said that they had never given the matter any thought). She soon discovered some highly exceptional ability in this six-year-old. He is presently in the third grade and the kind of unusual motivation provided by his early interest in snakes has been used to bring out certain other exceptional talents. Cases, such as

this, where the only indication of giftedness in science is a special interest, sometimes narrow but often intense and frequently appearing at a very early age, are not unusual.

The first method employed in identifying the gifted in science that comes to mind is the standardized test. The group and individual intelligence tests so commonly used are about as helpful as any device presently known for identifying special talent in science in young children. Tests designed to locate a particular subject-matter strength have not met with wide acceptance. Intelligence tests tend to measure the child's ability to understand abstract ideas of the kind common to much of science; one could, therefore, not seriously question their use in identifying the gifted in science.

Science achievement tests are rather commonly used. They provide a measure of what has been accomplished in the past, and by this means, give an indication of what might reasonably be expected in future performances. In recent years, a number of adequate tests have been developed for various areas of science at several grade levels. National norms make these tests useful for all students, and one of the additional values resulting from their use is that they provide the teachers with valuable information on all of his students. Their use may serve to identify students whose progress in science has been retarded, or they may call attention to those who should be achieving beyond their present levels; thus, they suggest the need for remedial efforts or special emphasis. Presently the science section of the *Sequential Tests of Educational Progress*¹ is finding acceptance with teachers and guidance counselors.

Those who use achievement tests must recognize that the achievement of very young children in science is apt to show more variability than it will at a later age. It will show the influence of special interests and unusual motivation. An isolated experience in science (a trip to the zoo, an airplane ride) may influence temporarily the child's achievement in a particular area out of proportion to its long-range importance.

Tests of specialized abilities may give further useful information. In science, those that measure mechanical aptitude or motor ability may be helpful. They can be used to gain a better understanding of a student or to single out students for work in special courses or on special projects.

Several interest inventories are available for children in the junior high school grades. While these may be useful with younger children in some cases, the student's interests during the elementary school years are usually recognizable by the parent or teacher. Inventories of vocational interests occasionally reveal information other than that which indicates a preference for a particular kind of work. If the preferred vocational area is highly scientific in nature, special talent in science may be indicated.

¹ *Sequential Tests of Educational Progress (Science)* (Princeton: Cooperative Test Division, Educational Testing Service, 1957).

The observations of teachers, parents, and counselors have great value in identifying the gifted in science. Teachers are generally in a position to observe a wide variety of student activities in day-to-day educational experience and these may provide as important information as any other method. Teachers should look for indications of high creative ability in thinking up and working out the details of science projects; they may observe *unusual capacity for insight into difficult abstract problems in science*; they may discover, through classroom recitation or in incidental conversation, outstanding ability to verbalize complex ideas or concepts in science; or they may discover a student with unusual drive—one who refuses to be stopped by the usual hurdles which one encounters at frequent intervals in scientific pursuits. Through conferences with parents, teachers may learn of exceptional devotion to science projects carried on at home; parents may tell of special interests or hobbies developed on vacations and pursued with unusual vigor. Observations of this kind must be given high priority in assessing the student's potential contribution in science. The element of drive, of exceptional physical energy and vigor in pursuing a difficult task over a long period of time, is a distinguishing characteristic of highly successful work in science, and teachers should be alert for such indications.

Creative expression is oftentimes an important mark of the talented student in science. In both the elementary and high school grades, the writing of science fiction stories may indicate exceptional ability in addition to providing a satisfying intellectual experience. Expression of this kind should be encouraged by the teacher and should be studied carefully as a means of assessing the student's creative ability in science. The practice of requiring students to write freely to express ideas in science is currently being used in some schools for the purpose of evaluating student work in science classes. This practice may serve equally well to help identify those with special talents.

The most important consideration for those who have the responsibility of identifying the gifted in science is to avoid any stereotyped model. Science talent takes many forms. It is not always a function of intelligence as measured by the usual I. Q. tests. It is often related to high mathematical ability, but not always. It may be associated with high verbal ability, but not always. It is sometimes not related to social skills, school leadership, or to athletic ability (we do not mean to imply here that outstanding science students are not outgoing, gregarious, or even athletic). To identify the gifted in science is frequently a difficult job which taxes the resourcefulness of the most skillful teacher. The job is further complicated by the fact that science has a great many "late bloomers." Every experienced science teacher knows children who showed no special ability until one day it suddenly burst forth. This means that we should not close the door to the tal-

ented in science; there must always be room in special programs in science for those who come late and who may arrive by long and circuitous routes.

PORTRAIT OF THE GIFTED IN SCIENCE

If we are to recognize the gifted child, we must have some idea of what to look for. We must develop a set of standards to apply to the boys and girls with whom we come into contact. Let us try to construct an image of the person who possesses special talent in science. The image may be fuzzy and unlike some children who are known to be gifted, but there must be certain common features possessed by the gifted in science, and even a rough sketch should be helpful to those whose job it is to single out the talented.

Fortunately, the stereotype of the child who has special interest and ability in science as one who is sickly and peculiar, wears thick glasses, and *retires to the solitude of his basement workshop when the other children head for the playground* is fast fading out. Studies show that the scientifically gifted, like his counterpart in other special areas, is more likely to be one who is strong and healthy, is emotionally stable, alert and happy, and gets along well with other children.

In addition to these general characteristics, the gifted in science may exhibit certain salient features related to his science pursuits. He may show exceptional ability in mathematics and may get great delight from working out complex problems just for the fun of it. His conversation may reflect his interest in quantitative relationships. He is almost certainly a curious person—one who raises questions about things, big and small, which most children take for granted. Related to his curiosity may be a trait which Brandwein, Watson, and Blackwood call "questing." They say, "This attribute is shown by a continuous discontent with present explanations of the way the world works—that is, a discontent with present explanations of various aspects of reality."² The talented in science accept nothing at face value—there must be proof! They have not learned that there are endless questions in science which are as yet unsettled and that, frequently, it is expedient to accept certain beliefs as *working hypotheses*. Nor have they been trained, and happily so, to become academically polite with respect to statements that seem to them untenable. The teacher is most often fair game as a target for challenging questions; television, newspapers, magazines, and even the textbook, which is held to be the final word in all matters by most students, may fail to satisfy the bright child in science.

² Paul F. Brandwein, Fletcher G. Watson, and Paul E. Blackwood, *Teaching High School Science. A Book of Methods* (New York: Harcourt, Brace and Company, 1958), p. 169.

The gifted science student is generally an avid reader of science books. On the other hand, one sometimes finds gifted children in science who read very little, a fact which may be due to extreme preoccupation with projects which involve working with equipment—building things. In general, though, this condition is a temporary one, and sooner or later the child discovers that books and magazines can provide him with much useful information.

Writing about science, including science fiction, may be a mark of unusual talent in science. Not only is this kind of activity valuable as a learning exercise (since the student generally must learn some particular facts and ideas to include in his story), but the student may find a sense of satisfaction in expressing his thoughts to others. Writing about science may provide a kind of release, this loosening of the imagination to run wild over the fantasies of science. Teachers are sometimes disturbed over their students' fascination with strange ideas and weird plans for space travel, people-disintegration, and death rays. Any real damage that results from such activity is rare.

No serious mention has been made of the less desirable qualities which we sometimes find in gifted children. Some of these are profoundly disturbing and may result in personality and discipline problems, which mask the true nature of the child. Problems of this kind provide some of the greatest challenges in teaching science. A mark of the exceptional teacher is his perceptiveness in discovering the child's ability, sometimes latent, sometimes concealed beneath a mass of personality conflicts and social undergrowth, and his provision of opportunities for its most rapid development.

The following case studies illustrate the different process development of two talented youngsters in science.

Robert

A mother and father may be good "science parents" without realizing it. They may be unaware that they are making any particular contribution to their child's intellectual development. They simply go about the routine tasks of running a home and raising a family in the way that seems most natural, but at the same time the intellectual climate which they establish is of first-order importance in the growth of their children.

Robert came from such a home. As a young child, he had a wide variety of interests and abilities. He could pick out simple tunes on the piano at the age of three. Following a visit to the city zoo when he was four, Robert asked for and received from his parents a book which contained colored pictures of animals along with short descriptions of their living habits. He and his father played animal games in which one would make animal sounds or animal-like movements while the other would try to guess what

animal was being portrayed. When Robert's interest continued to grow and his questions increased in number and complexity, his father found the time to take him to visit a large stock farm several miles from town. In addition, Robert's understanding of animals was increased by a family trip to the museum, where he saw a number of mounted specimens native to other countries displayed in simulated natural surroundings.

During his kindergarten year, Robert's grandparents brought him several seashells from Florida. He immediately set out to identify them. With the aid of a book which his mother borrowed from a neighbor, he was able in a few days to tell his parents the proper name of each.

He then began to collect seashells in earnest and was able to assemble a collection of more than one hundred, most of which he had identified from several books his parents had bought him.

Robert developed a variety of hobbies during the next three years. He began to collect stamps. With the aid of his father who alerted a dozen or so people in the office where he worked, Robert assembled an excellent collection. Robert's parents and adult friends commented frequently on his remarkable knowledge of stamps and his perseverance in working on his collection for long periods of time without interruption.

Sometime during the second grade Robert developed an avid interest in sports, and for a time it appeared that he might abandon some of his more academic interests. He collected cards with pictures of major league baseball players until he had more than any other boy in the neighborhood. He learned the rules of baseball and football with remarkable ease. Despite the fact that he played ball mostly with older boys, he managed to compete with better than average success. Once again his father aided in Robert's growth by taking him to see a number of games, by explaining some of the more complex rules, and by buying him a book on American sports.

In the fourth grade, Robert began to display an unusual interest in science as such. He had since the first grade been a good and devoted reader. Now his reading was directed increasingly to science books. His particular passion was books about animals, especially insects. By the middle of the fourth grade, he had read every book on insects the school librarian could locate and had made serious inroads on the supply at the public library downtown. For a time, he felt a certain dismay when he attempted to read highly technical books on an advanced level, but an alert librarian wisely directed him to a college teacher who was able to help him select books better suited to his needs. The previous summer, he had begun to collect insects and to mount them. He had identified many of his specimens. Now with the aid of several good books on insect identification, he collected in earnest. Robert lived in a good-sized city and was unable to secure a large variety of specimens in the streets and parks near his home, but during the following summer his family vacationed at a lakeside resort where he

found an abundance of good specimens and the best possible opportunity to collect. He had previously been instructed by his college teacher friend in how to make a collecting net and killing jar, how to spread the wings of his moths and butterflies, and how to mount them in an attractive display. When Robert returned from his vacation, he had scores of butterflies, about a dozen large moths, and over a hundred other small insects. In addition, he had collected several cocoons which he kept in the hope of seeing, for the first time, an insect emerging from its temporary home.

During the fifth grade, Robert began to make pencil sketches of his moths and butterflies. Several of these claimed the attention of the art teacher, who commended him for his good work and placed them on the bulletin board for display. His interest in art continued to develop and, under the tutelage of the art teacher, Robert began to make water color paintings of his most attractive specimens. The art teacher has continued to encourage him and has suggested several items of painting equipment to his parents as likely Christmas gifts.

In junior high school, Robert had a science teacher who was genuinely interested in his collecting and who had a fairly good background in entomology. He suggested that Robert might find a surprising number of small insects in his lawn and in the nearby park, especially at night. The results surprised even Robert. When he found that he was unable to identify some of his new specimens at first glance, he began, with the aid of his science teacher and his friend at the nearby college, to use keys to help find the proper names. He became fascinated with the scientific names and soon learned the genus and species names of most of his collection. His facility with language helped him master the names, and probably his intense interest in taxonomy provided further motivation for language development.

Robert is at present taking biology in the ninth grade with an accelerated class. He finds the normal class work easy and at times regards it with impatience. The biology teacher has permitted Robert to go to the library to study more advanced materials during some of the class periods. Robert has begun work on a project for the Science Fair and spends much of his class time on it plus several hours each day at home. The project consists of an experiment to determine the effect of wheat germ on the rate of regeneration of earthworms. The biology teacher regards this project with some misgivings, but Robert, for some unexplained reason, has refused to give it up. When the biology class reaches the study of genetics, the teacher plans to encourage Robert to undertake a series of experiments on fruit flies.

Robert's pattern of growth in science is interesting in many ways but not highly unusual. Several aspects of his background stand out: He developed interests in things scientific at an early age; his interests changed from month

to month and year to year, even to the extent that some of the family friends became concerned that he might give up his intellectual interests in favor of sports (although his parents never seemed to share their alarm); and Robert received encouragement from his father and mother. The willingness of Robert's parents to arrange visits to places of scientific interest, to furnish books, and to show consistent interest and sympathy without being patronizing were unquestionably factors of considerable importance in Robert's growth.

Marilyn

Ever since her babyhood, Marilyn has been the center of attention. She has always been a beautiful child, made more so by the special attentions of her mother. At the age of three she won a local baby contest. A friend of the family attributes her victory partly to the fact that she was pretty and partly to the fact that she was smart enough to act up for the judges at the right time. Her mother has always been overly attentive—friends feel that other children in the family would have been better for both Marilyn and her mother.

Almost from birth, Marilyn left no doubt as to her ability. She could roll over when about four-weeks-old, and she was walking at eight months. At a year and a half, she was talking in rather complete sentences. Before starting kindergarten, she had developed a deep interest in a number of things—animals, numbers, stars, her father's typewriter—and before the end of the kindergarten year she had mastered the first grade reader with very little help from others. Her most outstanding intellectual feature however, was her ability with quantitative concepts. She developed an unusual mathematical insight which enabled her to figure out what day of the week a given date would fall on even when the date was several months ahead. In addition, Marilyn loved Spanish, which was offered in her school beginning in the first grade, and she far surpassed in mastering the spoken language any child of like age in the memory of the Spanish teacher, a man of many years' teaching experience.

As the years passed, Marilyn's most notable feature was her unusual ability in several fields. She stood out especially in science and Spanish. As her reading ability continued to develop, she began to make increased use of science books from the library. She preferred physical science and soon found a number of juvenile books on chemistry and electricity which fascinated her. All of this came to be viewed by her mother with some misgivings, since she felt that Marilyn was too delicate and too feminine for science. Her mother viewed with genuine alarm the day during the fourth grade when Marilyn came home from school carrying a book entitled *A*

Boy and a Battery and proceeded to ask her father for some wire and two flashlight batteries.

Marilyn continued to be a vivacious child, and, in addition to her unusual intellectual powers, she gave early promise of being a good athlete. She could always run faster than any other girl in her class, and, during several grades, could beat the boys as well. She was an avid tree climber and an excellent swimmer. Marilyn's mother continued to have reservations about the child's participation in such activities but showed considerable wisdom in permitting Marilyn to do pretty much what came naturally. Marilyn's father, a teacher of mathematics at the local high school, used various subtle schemes to dissuade the child's mother from interfering with her activities in athletics and in science.

In the sixth grade, Marilyn came upon a book on chemistry for younger children and from it found a fascinating new area of interest. She memorized the symbols of about twenty of the most common elements and delighted in showing off her new language to her classmates. She could recite many formulas and appeared to have at least a little understanding of simple chemical reactions. She surprised adult acquaintances by talking casually about acids and bases and even appeared to have some understanding of ionization.

With her interest in chemistry and her love for becoming involved in any active pursuit, Marilyn's contact with laboratory experiments was inevitable. At first she had one of the standard, commercial chemistry kits, which she became bored with after a couple of weeks. She then found other, more advanced books with ideas for a great many home experiments. Most of the materials she bought at drug stores, but in a few cases she sent away for reagents and glassware and got other items from certain of her father's acquaintances who worked in some field of science. By the end of the sixth grade, Marilyn had done dozens of elementary exercises and several other experiments which showed some originality. She suffered one slight injury from broken glassware, and on two other occasions had to be prevented from continuing with the experiment until her father had the high school chemistry teacher inspect the project.

Marilyn's mother is ever fearful that some accident will befall her daughter but has been surprisingly cooperative in permitting the child to follow her interests even though they do not agree with her own ideas of what young ladies' interests should be.

Marilyn is now in the seventh grade and is fortunate in being able to attend an excellent junior high school. Her teachers are genuinely interested in her progress and her interests and have already taken steps to help her. The guidance counselor has administered several standardized tests, which show a somewhat unusual pattern of abilities and aptitudes. She ranks at the ninety-ninth percentile in quantitative understandings and at

the sixty-fifth percentile in linguistic ability—yet her aptitude for Spanish has been unusually high all through the first six grades. Her I. Q., as measured on three different occasions by group tests, is between 145 and 150. In certain areas, notably social studies, she does not do outstanding work, in spite of a rather high I. Q. This is the source of some concern on the part of her parents and teachers.

Socially, Marilyn is still the center of attention. She is an outstanding girl athlete and could almost certainly excel at tennis or swimming or whatever sport she chose to participate in. She is still highly attractive and will unquestionably become a beautiful young lady. She is popular with her classmates and is well liked by her teachers. It is a matter of some concern, mostly to her mother, that she has never been elected to a school or class office.

When asked what she would like to do when she grows up, Marilyn looks blank. She professes not to have given the matter any thought, and she cannot be drawn into a serious discussion on the subject. She doubts that she wants to be a chemist, but she is not sure why she feels that way.

The school guidance counselor and her seventh-grade teachers agree that Marilyn, while a delightful child and a joy to work with, is using only part of her ability and has a great unrealized potential. They agree that versatility is her distinguishing feature and that she could, if she wanted to, excel in almost any field. The guidance counselor has the uncomfortable feeling that his measuring instruments are not telling him all he should know about this unusual child.

The foregoing accounts of gifted children should help to construct an image of the gifted child in science. But, of course, there is no such thing as *the* gifted child. There are as many types as there are gifted children. One thing stands out: the children have at least as many differences as they have similarities. Some gifted children in science, like Robert, behave according to a recognizable pattern; others, like Marilyn, fall into the pattern in certain important ways but present, at the same time, certain characteristics which are disconcerting to parents and teachers and which are largely unexplainable.

In a majority of cases, nevertheless, a certain configuration of behavior exists which the skilful, perceptive teacher will detect. The presence of such behavior must not be allowed to go unnoticed. It must not be masked by troublesome social behavior or intense interest in non-academic pursuits or indifference. Giftedness must be discovered; then it must be nurtured and guided. The science teacher and his science program have unique opportunities to bring about the accomplishment of these goals.

The following checklist will enable teachers to identify children with special aptitude in science. The child who possesses all of the traits listed will be rarely found, if ever; the child who demonstrates several of them

almost certainly is one who has the potential for outstanding work in science.

A Checklist for Identifying Gifted Children in Science

Interest in science during the pre-school years.

Curiosity as to what makes things work.

Ability to understand abstract ideas at an early age.

Strong imagination in things scientific.

A love of collecting.

Abundance of drive—willingness to work on a science project for long periods of time in the face of difficult obstacles.

Better-than-average ability in reading.

Better-than-average ability in mathematics.

Unusual ability to verbalize ideas about science.

High intelligence, I.Q. of 120 or more.

Tendency to think quantitatively—to use numbers to help express ideas.

Willingness to master the names of scientific objects.

Willingness to pass up sports and other games in favor of scientific pursuits.

Tendency to relate stories about science, including the writing of science fiction.

Creativity in science projects, including writing.

Evident discontent with reasons which other children readily accept for things scientific.

Unwillingness to accept explanations about things scientific without proof

Exceptional memory for details.

Willingness to spend long periods of time working alone.

Ability to generalize from seemingly unrelated details.

Ability to perceive relationship among the various elements in a situation.

SOME CURRENT PRACTICES IN SCIENCE PROGRAMS FOR THE GIFTED

One shortly discovers, in studying the literature on programs for the gifted, that published reports of evaluations are scarce. French points out that in order to evaluate the effectiveness of a program, one must first understand its goals and objectives.² As the objectives depart from the improvement of academic performance, they become harder to evaluate. Measuring instruments do not do a satisfactory job of determining the extent of the child's growth in many of the important ways which educators think are desirable for gifted children. Such variables as the development of leadership qualities, the ability to think critically, and the development of an understanding of the role of science in the modern world are

² Joseph L. French, ed., *Educating the Gifted* (New York: Henry Holt and Co., 1959), p. 459.

difficult to measure objectively. French reports that evaluations tend to center around the measurement of achievement, personal and social adjustment, and attitudes of children, parents, and school personnel toward the program.⁴ They do not tell much about student growth in science except that social adjustment, attitudes, and similar factors are as important for children studying science as they are in the rest of the school program.

Generally science plays a rather prominent role in special programs for gifted children. The ease with which science lends itself to special reading assignments for children, to both group and individual project work, to correlation with other subjects, and to creative work on the part of the student undoubtedly accounts for the important part which science plays in programs for the gifted. Recently a group of fifth-grade children were asked to think about and write down the thing they would most like to learn about as they prepared to go to the school library to do reading and research. They were free to choose any topic they wished. Out of twenty-four students, twenty chose topics in science. Clearly the prominent position which science activities occupy in most programs for gifted children means that any general endorsement of such programs has real meaning for those whose special interest is science.

We are fortunate in having a number of good programs for gifted children in this country which include special arrangements for elementary school children in the area of science. In other cases, however, science receives something less than its rightful share of the school's resources in the operation of programs for the gifted. One could speculate freely as to the cause of this situation; the most likely answer is simply that the shortage of teachers with even minimal training in science in the elementary school is reflected in special programs for the gifted as it is in the entire school program. Nevertheless, a consideration of certain outstanding programs is in order.

School people in Cleveland have been active for almost forty years in developing programs for highly talented students.⁵ The distinguishing feature of the Cleveland plan is "the major work program." Its purpose is to group gifted children together in special classes where they study the same topics as the boys and girls in the regular classes. The difference is that the gifted children delve more deeply into the various subjects. They are directed toward the development of knowledge and skills and other important values often associated with science education, such as critical thinking. Cleveland's program can justly be called an enrichment program.

Reports of the Cleveland program have discussed its emphasis on

⁴ *Ibid.*

⁵ Walter B. Barbe and Dorothy Norris, "Special Classes for Gifted Children in Cleveland," *Exceptional Children*, Vol. 21, November 1954, 55-58.

science. The stress placed on critical thinking and creativity indicates that science activities are doubtless encouraged by the teachers.

The following statement was made by a person who had visited a major work classroom of fifth and sixth graders. The children were explaining their projects to the rest of the class.

Rose-Marie had made an elaborate map of the country showing where the various types of soil occur. She used scientific terms for these soils that I had never heard of.

Arthur had made a mobile, very gay and colorful, on the sources of light, sun, stars, flame, electric filament, radium paint, a firefly. Maybe there were more

Eugene had made a cut-away model of the human heart, about the size of a football. It was quite as impressive as something you see in a health museum. Materials included plaster of Paris, window screening, plastic tubing for veins, a carved turnip for something else, and candles warmed and then bent for arteries. Only he said things like "vena cava" and "aorta."

Helen demonstrated the subject of vision and color by various devices. She showed us the mixing of pigments; the mixing of light by spinning discs; the eye's fatigue, on staring at one color, that will produce an after-image of the complementary color—and other matters even more abstruse.

David had made a model of the solar system. It was not exactly to scale, but then you could hardly get a true scale model onto a football field.

Harvey had built, for eight dollars he'd earned by his paper route, a one-tube radio set that worked nicely. He had become interested by watching a radio "ham" who lived next door, he had studied up on the subject, and he told us that a radio wiring diagram in a scouting manual, of the set he'd chosen to build, had mistakes in it. Then he drew the right diagram on the blackboard, with explanations. I did not try to follow. Along with 998 other adults out of a thousand, I could not draw even the most elementary diagram to show how radio works.

And as a last sample of what can interest a gifted child, Genevieve had taken a cardboard packing box and made a diorama of the strange, luminous fishes at the bottom of the ocean. It was beautiful, and it cost fifty cents for the paint.

As handiwork, these various exhibits must have been great fun for the children to make. But there is rather more to the picture. Each project, if you will glance back over the list, must have depended upon each boy and girl having an unusual skill and ease in traveling through the world of books. You will not find soil geography or abyssal fishes or the theory of color vision in the first book at hand.*

* Theodore Hall, *Gifted Children. The Cleveland Story* (New York: The World Publishing Company, 1956), pp. 58-59.

In Pittsburgh, a plan has been developed in which the children are placed in special classes only for part of the day.⁷ They study most of the academic subjects in special groups but participate with the other children in homeroom activities, art, music, and physical education. The Colfax School, where the plan here described is carried out, includes kindergarten through grade six. Two workshops (so-called because the term implies nothing better for the special groups than the program for the rest of the children) have been set up. The junior workshop is for grades one, two, and three, and the senior workshop for grades four, five, and six. During the part of each day which the child spends in the workshop, he studies, in addition to science, the language arts, social studies, and mathematics. There is more opportunity to delve deeper into science problems than could be done in regular classes. Emphasis is placed on student research projects. The child begins to learn the proper methods of collecting data and searching for information in the junior workshop and by the time he reaches the sixth grade, a written report representing a full semester's work is required. The teachers in charge of the senior workshop, especially, strive for the development of effective oral and written communication and intelligent participation in group discussions.

*Enriching the regular classroom program is a method commonly used to meet the needs of the gifted child in science. By this method many teachers, in their own way, accomplish what might otherwise be done by special class programs. In Portland, Oregon, school officials have worked to provide special facilities and conditions which will encourage classroom teachers to develop special activities for the gifted in their regular classes.*⁸

The strength of the Portland program appears to be in the unusual character of the classroom activities and the effective procedures for involving gifted children in them. For example, in a first-grade class, a mother rabbit was brought to class just before she was to give birth to young. After the bunnies were born, they were named by the children. Many important scientific facts were brought to light as the children watched the mother care for her offspring and young rabbits grow and develop. From these experiences creative stories and plays were written, games were made up, and arithmetic concepts were employed to figure the cost of feeding the rabbits and building their cage.

In the third grade a talented boy with special interest in science built

⁷ Dorothy E. Norris, "Programs in the Elementary Schools," *Education for the Gifted*, The National Society for the Study of Education, Fifty-seventh Yearbook, Part II, N. B. Henry, ed. (Chicago: The University of Chicago Press, 1958), pp. 240-242.

⁸ *Ibid.*, pp. 246-257.

several of the instruments for use in a weather station. He made a wind vane, an anemometer, and several kinds of barometers. He measured the rainfall and kept records for his daily weather reports to the class. His weather map required not only knowledge in science but important facts in geography and skill in drawing. It would be difficult to deny that the activities were for him enriching experiences.

In the higher grades, children are encouraged to build radio sets and telegraph equipment, to wire the lights for the stage, and similar, more advanced tasks.

The above descriptions prove, if anything, that programs for gifted children can and do take many forms. Differences in the programs described here, and in other successful programs in this country, leave little doubt that methods which differ sharply can be used with equally good results.

BUILDING AN ADEQUATE SCIENCE PROGRAM

An important feature of a good science program for the gifted is that it does not simply squeeze the same offerings into a shorter period of time; rather it provides enrichment for the gifted child. The tendency to permit the bright child in fifth grade to do the work normally encountered in the sixth grade may help but does not really solve the problem. For if this policy is followed to its logical conclusion, the day must surely come when the child will have completed the standard science program one year, or perhaps two or three years, earlier than the rest of the children. The school then has the responsibility of providing additional work for the balance of the time until the child moves to the secondary school. Why not instead spread out the program of enrichment to all of the grades in school and permit the gifted children to share in the enriching experiences as they go along? Various specific methods are described below which classroom teachers can use to conduct advanced work for gifted children in science.

For the child who shows evidence of unusual ability in science, the special program in science education should start as early as possible. It should involve him in working with science at the advanced level of ideas and concepts and relationships. It should allow him to search for answers, to discover scientific information on his own. He should be given assignments that are different from those given the other children, not just longer. The all too common practice of having the bright child do the same problems as the rest of the class, plus numbers 11 through 15 in addition, is enough to make the child wish he had no special talent—and furthermore,

to try to prove that he has none by performing at a mediocre level. Special programs for the science gifted should encourage the student to participate in individual and group projects of such a nature that his participation will make him feel genuine satisfaction in his work, in doing something beyond what the other children have done. This type of activity may on occasion result in intellectual snobbishness, but it need not do so. Proper motivation and guidance on the part of the teacher will help the child understand that he can be one of the class and yet perform certain tasks apart from the others.

Gifted children should be invited to help plan programs which are set up especially for their benefit. Their unusual talents should be used in their own behalf whenever possible. Their teachers may fail sometimes to recognize that their creativity and their own intelligent analysis of their abilities and interests may place gifted children in the best position to assess their needs. We should plan *with* gifted children, not just *for* them.

The question of whether gifted children should begin special work in science at an early age is sometimes debated. More reasons appear to be for than against. Children who are gifted in science are almost always marked by an intense curiosity about natural phenomena. They want to know how things work, and why. In this way they are most clearly set apart from their less gifted peers. The science activities most suitable for children in the elementary school usually do not enable children to find the answers to penetrating questions of the kind so typically asked by the gifted. The unusually bright child deals in abstractions; his creative mind is often involved with problems which can be related to the thoughts of other children only by a different dimension. Thus the science activities in which he engages should be different and should start as soon as his scientific curiosity appears.

Respectable research projects can be carried out by some children, even by the ten- and eleven-year-olds in the elementary grades. Teachers can prepare in advance, with the aid of a high school science teacher or other persons trained in science or even with the gifted children themselves, a list of problems which the student can attempt to solve by methods of his own choosing. To illustrate, a group of fifth-grade children spent two weeks studying sound. At the end of the unit, two of the children had mastered rather thoroughly every aspect of sound that had been taken up and had given evidence of wanting to extend their knowledge into other areas. A boy who was a gifted student in science and, in addition, did outstanding work in arithmetic was assigned the task of finding the relationship between the tension in a string and the vibration frequency of the musical note produced when the string is plucked. The teacher offered only the slightest hint as to how the problem might be solved. The boy learned that one can determine rather accurately the frequency of a note by comparing it with

a similar tone produced by a pitchpipe. If the note produced is middle C, for example, one can look up the vibration frequency of C in a physics textbook. This particular student tied the string to a hook in the wall and attached a brick to the other end. He then plucked the string, once again identified the note, and looked up its frequency. At this point, the child encountered a mathematical barrier which gave him trouble (the concept of square root), and without help he might not have been able to solve the problem. But the point is that when a challenging problem was presented to him, he found genuine satisfaction in seeking its solution. The final, accurate answer may be of secondary importance anyway. The boy's real joy came from designing his own experiment and approaching a solution to it. He will, almost certainly, be eager to try another experiment of this type. And many highly talented children derive greater satisfaction from this type of research activity than from the more popular building projects such as assembling radio receivers.

Most gifted children are good readers. It follows then, that a fruitful activity in science, and one of the easiest to implement, is supplementary reading. Of course, the teacher must exercise care in directing the child to the proper materials, but outside help is available. The "Collection of Junior Library Books Selected for Schools and Libraries" contains scores of titles in science grouped according to grade level.⁹ This little pamphlet contains the titles from twenty-seven publishing houses and provides a ready reference in locating juvenile books. For children in the upper elementary grades or the comparable junior high school level, the list of the American Association for the Advancement of Science includes a large number of suitable books, including several of the classics in science for young people.¹⁰ A purposeful reading program for the gifted child has benefits beyond those related to science. In making reports to the other class members, the child may dress up in a costume to portray a character; he may build special equipment to use in explaining or demonstrating some facet of the book; or he may lead the class in carrying out a project based on his reading.

Opportunities for the exercise of leadership in the classroom must not be overlooked. The child who has special scientific talents has at least as much right to become a leader as the one who is superior in athletic ability. His special talents and interests should not be the cause of his being overlooked in the selection of leaders. The gifted child should, like all others, stand on his qualifications in matters of this kind. The role of

⁹ Often obtainable at book fairs and similar exhibits; also available from the twenty-seven well-known American publishing houses.

¹⁰ Hilary J. Deason, *Books of the Traveling High School Library* (Washington, D.C.: The American Association for the Advancement of Science, 1957).

the teacher here may be to create an intellectual atmosphere that will not permit the child to be branded as a "brain" whose only competence is with books. Perhaps the tendency to regard children in this light is less a problem in science than in some other areas since the student with high ability in science may be able to do things—build electric motors, radios, hot rods, or win prizes in science fairs and other contests—which place him in a position of esteem with his peers.

Still another characteristic of a good program in science for the gifted is the presence of opportunities for the children to pursue problems and topics which hold special interest for them. Just as the skills and abilities of the gifted child exceed those of his classmates, likewise his interests almost invariably range beyond those of his fellows. He is not content to do *more* of the same things; he wants most of all to do *different* things. And this is precisely the point at which many teachers, especially those who lack training in teaching exceptional children, find themselves confronted with a most perplexing problem, namely, that of knowing enough science to be able to stay ahead of the child. The only acceptable solution to this problem is acceptance on the part of the teacher that he need not know as much science as some of his students.

Wise science teachers have long recognized that a single teacher cannot possess wide knowledge about all the topics which interest the abler students. To attempt to equip oneself with knowledge of such magnitude is impossible, and to refuse to admit one's limitations openly and honestly to the children is to place oneself under a severe handicap in relations with students. The child's great need is for counsel and support, for encouragement and hints on where to find books, magazines, and materials for projects. The teacher should help him locate people in the community who have special knowledge in the child's particular area of interest, or perhaps provide information on where the child can write to establish contacts with experts outside of the local community. Scientists, hobbyists, college teachers, and others derive great joy from working with children who are engaged in activities related to their particular area of specialization. Adults are often eager to "adopt" children for this purpose. Science talent, in order to be developed to its full potential, must be allowed free rein to pursue problems of special interest.

Science teachers, perhaps more than the teachers of other subjects, are inclined to insist that concepts and principles learned in the classroom be related to commonplace events and objects in the child's everyday world. This policy, when followed to a moderate degree and with wide variations to allow for the differences in children, is a valuable teaching technique; but teaching of this kind may in some cases seriously hamstring earnest, creative scientific study. The gifted child frequently finds great delight in studying science for science's sake and is sometimes bored by attempts to

popularize the topic on which he is working. The sheer delight that comes with setting up an incubator, for example, and growing bacteria may be the ultimate activity for the child in terms of his current needs and interests. The fact that bacteria cause certain diseases and are the object of an unceasing war by man may be a matter of little interest to the gifted fifth grader. And to insist that he learn to recognize the various shapes and kinds of bacteria and to memorize their names may have a decidedly bad effect. Gifted children think at the level of abstractions, and any attempt to invade this realm of intellectual activity may serve to interfere with the child's developing science interest.

Science teachers are in a unique position in the matter of special, out-of-class activities for the gifted. All manner of clubs may be used to good advantage. Special interest groups can be formed to work in astronomy. The children can build telescopes, use star maps, build simple planetariums, read about possible life on other planets, study eclipses, and carry out numerous activities of these types. Interested adults in the community are often willing to serve as sponsors or advisors to such groups. In many cases, the organizations can affiliate with national groups, which make special provisions for children's participation. The Audubon Society, for example, makes certain valuable materials available without charge to elementary school groups who are interested in bird study.

Some additional features of successful programs in science for gifted children have been observed. Among these, the provision of opportunities for self-expression and correlation with other subjects is important. Teachers must be ready to break down the boundary lines between subject areas. This, of course, is true in varying degrees for all children, but it is especially important for advanced students. They are quick to see logical relationships and tend to become bored by requirements that they carry out repetitious assignments in different subjects. Teachers sometimes lose sight of the fact that science lends itself readily to creative expression in art, drama, manual skills, even music. A first-grade boy with truly unusual talent in art was discovered when the children were asked to make crayon drawings of the animals which they had collected on a field trip. His drawing of a leopard frog was a remarkable piece of art work and led to further activity in drawing and painting under the special guidance of the art supervisor. Significantly, the child's interest in science did not diminish—rather his interests in science and art were complementary. Writing stories and essays involving science, including what is commonly known as science fiction, has been used advantageously. Designing and drawing machines and apparatus such as futuristic automobiles and airplanes, space ships, houses, furniture, and guns may be a rewarding activity for the child and may encourage serious investigations in science. In the upper elementary grades, especially, a gifted child may become concerned with such things

as the center of gravity of the experimental car he has designed, stresses and strains on the structural supports for his home of the future, or the lifting power of the wings on a new type of airplane.

A. Harry Passow has described seminars for talented students in science in the elementary school.¹³ These might be used in a number of ways. The suggestion here is that children meet periodically just for the purpose of talking about their ideas in science and perhaps building on the ideas of others. The purpose of the gathering is not to formulate plans for a project of any kind, although some activities and projects would surely result from sessions of this kind. The major purpose is to exchange ideas "just for the fun of it." Still none could deny that the expression of ideas to an audience is in itself a valuable experience. A somewhat similar technique has been employed by certain industrial and research organizations, as one research scientist put it, "just to see what comes out." An adult should be present to lend an element of control to the discussion and to give it direction when necessary.

Good programs in science should help the child to gain the experiences and the knowledge necessary for a career decision. This is at least as important a function of science for the gifted child—perhaps more so—than for the less-gifted child. The unusually bright child may pass up science as a career only because in his early school years he could find no opportunity to learn what science is all about. Lacking this opportunity, his abundant talents and energies are directed to other things for which he may actually be less suited. On the other hand, real experiences with science sometimes convince children that they have no genuine interest in science, that the building of model airplanes and constructing things with Erector Sets is, in many important ways, far removed from science. The proper channeling of interests which effect the selection of careers is most important for the gifted.

Finally, one cannot fail to notice that good programs for gifted children tend to "rub off" in various ways. Teachers are more alert to the needs of all children. Special activities in science carried out by one child invariably trigger activities by other children. Excitement on the part of a child over a good book almost certainly encourages other children to read. When the attention of school patrons is brought to one part of the school program, other parts generally share in the benefits; and such benefits may include increased financial support from taxpayers, increased parental interest in the schools, willingness of business and industry to help with special programs, improved status for the teachers in the community, and others.

¹³ A. Harry Passow, "Developing A Science Program for Rapid Learners," *Science Education*, Vol. 41, March 1957, pp. 104-112.

SOME PROJECT IDEAS FOR THE GIFTED IN SCIENCE

Let us now examine more carefully some special projects and activities for gifted children in elementary science. Those to be described in the following paragraphs should be viewed only as representative of the hundreds of science activities which are admirably suited for this purpose. They will employ many of the features described in the previous section.

Activities and projects in astronomy, space travel, and related topics:

FOR GRADES ONE, TWO, AND THREE:

1. Have the student read about the sun, moon, stars, and planets. Many fine juvenile books on astronomy are available at all grade levels. Also suggest reading legends about the stars and reporting to the class on these non-scientific but interesting stories.

2. Observe the moon, stars, and planets through a telescope. Refer to simple star maps to be found in most children's books on astronomy, and try to locate well known stars and constellations. Find the Big Dipper, the North Star, Draco, and others.

3. If possible, have the child visit a planetarium and report to the other children. Such institutions generally pass out literature describing their various programs and giving information on the sun, moon, stars, and planets. Such material might be used in the reading program for the gifted child and in other ways to correlate with the regular school program.

4. With or without the aid of a telescope, have the child try to answer the following questions from his own observations of the sky:

a. First, find the North Star by extending a line through the two end stars in the cup part of the Big Dipper; go out about five times the distance between the two stars in the direction of the open side of the dipper's cup, and you will locate the North Star.

Observe the North Star over a period of several hours during the course of an evening. Does it seem to move? (Hint—mark its position by standing each time in the same spot and lining the North Star up with a fixed object such as a tree, pole, house roof, or the like.) Do the other stars and constellations seem to move during the evening? If they do, is it from east to west or west to east?

b. In what direction does the moon cross the sky?

c. Mars is called the Red Planet because its glow appears to be orange-red in color. Can you find Mars?

d. Do you see the same stars and constellations in the winter that you see in the summer?

e. Wait for the first night in the next month when the moon just appears above the eastern horizon. Record the time. Observe its first appearance the following night and record the time. If possible, repeat the third night.

FOR GRADES FOUR, FIVE, AND SIX:

1. Encourage the child to investigate the different kinds of telescopes. He will be able to understand the basic principles of reflecting and refracting telescopes. Both are described and diagrammed in many of the children's books on astronomy.

2. Suggest that the gifted student build his own telescope from a kit. These are available at various prices and their construction is a valuable experience from the standpoint of understanding the instrument as well as developing manual skills useful in other scientific endeavors.

3. Star finders can be made by children at this age with little difficulty. A simple but effective device for learning the locations of stars can be made from a shoe box. Cut one end out of the box. In the other end, cut a hole large enough to insert a flashlight. Now cut several pieces of cardboard just large enough to cover the open end of the box. On one piece of cardboard mark out the Big Dipper, North Star, Ursa Major, Ursa Minor, and others in the northern sky. With a sharp object, make small holes in the cardboard where the stars have been located. Now by placing the cardboard over the open end of the box and shining the flashlight into the hole in the other end, in a darkened room you can see the positions of the stars. A number of different pieces of cardboard representing different stars and constellations can be made in this manner. They can be made up by referring to star maps, or the reverse technique may be employed—the star finders may be based on actual observations of the sky, with the child then attempting to identify the stars from maps to be found in books.

Children of all ability levels enjoy this activity and are helped to learn the stars by this method. Gifted children are able to carry this activity to a fine point and may find it a stimulating experience. The teacher may find that the gifted child can carry out this type of work in the classroom while the other children are doing the regularly assigned work. Thus, the star finder becomes an enriching activity for the classroom, and one which can be introduced with little teacher effort and no expense.

4. Have the child use a standard globe, or some large, spherical object such as a rubber playground ball, and lay out the 15 meridians of longitude representing the earth's 24 time zones. If a ball is used, the continents should be drawn on its surface using paint or water colors. The child may wish to sketch in the larger countries and perhaps the oceans as well. The meridians can be painted on, using a contrasting color—preferably white. The child should be challenged to develop an understanding of the earth's division into 24 equal (roughly) time zones. He will find use for his knowledge of arithmetic in locating the lines and in determining the time in say, Japan, when it is three o'clock in his own location. Of course, the International Date Line should be identified and the student asked to ex-

plain whether one goes forward or backward a day when crossing the Date Line traveling westward.

The talented sixth grader should be able to carry out this project with the aid of one of the numerous elementary books which deal with time, astronomy, space travel, and similar topics. A good encyclopedia, also, will provide the necessary information. The child need only think through the matter of the earth's rotation and picture in his mind the sun shining on one side of the earth as the earth turns. This activity requires, for the fifth or sixth grader, a considerable measure of abstract thinking of the kind which gifted children typically can do. The child would undoubtedly benefit from explaining his project to the other boys and girls; the very act of verbalizing the concept of time zones is one of the important benefits to be gained.

5. The belief is commonly held that the moon is bigger when it appears just over the horizon than later when it is higher in the sky. Challenge a capable student to show experimentally that such is not the case, that this is just an optical illusion.

The method, of course, is to measure the moon carefully when it is low in the sky by holding at arm's length a coin which just covers the moon, or by viewing the moon through some adjustable device such as the jaws of a monkey wrench, and then repeating the measurement later in the evening for comparison.

This may lead to further investigations of optical illusions and making various drawings and devices to illustrate them. Such activity can be extremely fascinating for the child who enjoys the peculiar type of analysis and reasoning involved in understanding optical illusions.

6. Using a flashlight or an electric light, a baseball, and a golf ball in a semi-darkened room, eclipses can be readily shown. Provide the materials for the gifted child, then challenge him to use them to demonstrate a lunar eclipse and a solar eclipse.

7. Invite the child to provide explanations to the following questions which are of basic scientific importance. To answer them adequately will almost surely require some additional reading by the child.

- a. Do we have reason to believe that there is life on other planets?
- b. Explain the causes of the tides.
- c. Why is the same side of the moon always toward the earth?
- d. Are the canals on Mars really man-made (Martian man, of course) structures for conducting water from place to place on that planet?

The projects and activities given above typify those which resourceful elementary school teachers can employ with gifted science students. Activities of this type may lead to the organization of clubs composed of children with common interests. A person from outside the school who shares these

particular interests may be pleased to serve as sponsor or counselor to such a group. Of course, much of the activity described above can be carried out during the school day as part of an enrichment program for the gifted child. In cases where a project of this type has been done well and the child develops facility in explaining it to others, the child can also visit other classrooms to exhibit and demonstrate his work. Finally, in all of the activities described in this section, ample opportunity exists for teacher-pupil planning to take place. Suggestions by children often result in valuable activities and experiments. These and other benefits will be derived from the kinds of activities for gifted children described above.

NEEDED RESEARCH IN SCIENCE FOR GIFTED CHILDREN

In spite of a rather widespread reliance on science activities in special programs for the gifted, we find almost no research which discloses how well such programs succeed in terms of pupil growth in science. We need to investigate the following problems:

1. In programs where special emphasis is placed on science, do such children show evidence of satisfactory growth in reading, in mathematics, in social relationships with other children, and generally in their total development? In other words, can science be used as a vehicle on which other important elements of the school program can ride to success?

2. Do worthwhile experiences in science in the elementary school help the gifted child prepare for advanced work in science when he reaches junior or senior high school? Do these experiences help him in his selection of a career?

3. Can out-of-class science activities under the guidance of the teacher or another interested, qualified person satisfactorily provide for the needs of gifted children in science? Assuming the child is permitted to spend some class time working on special projects which are really part of an out-of-class organization, can his needs be provided for without setting up special classes or providing classroom instruction which differs significantly from that provided for the other children?

4. What is the relative effectiveness of certain procedures and techniques used in working with the gifted in science? How successful are the following: writing science fiction stories, group project work, individual project work, science fair projects, field trips, science clubs, science toys and construction kits, science television programs?

5. Do teachers who are shown to be successful in working with the gifted in science possess better-than-average training in science?

6. At about what age does special talent in science usually begin to show up?

7. Does the presence or absence of science experiences in early childhood have a significant influence on the gifted child's interest in science in later years?

8. To what extent is there correlation between the very bright child and the very high achiever in science?

9. Is giftedness in science related to sex?

SUMMARY

In no sense can this nation afford to waste the science talent of its bright children. Their contributions in science are of the greatest importance; they may even make the difference between success and failure in the present international competition for technological superiority. The creative thinking so essential in scientific research, particularly in basic research, very likely comes largely from the gifted.

Several different kinds of measuring instruments and techniques must be used to identify the gifted in science. While most of the standard methods are valuable, the teacher must be alert for certain personal characteristics which are often associated with giftedness in science. The element of drive is an important quality to look for, even in young children. A variety of people should contribute information on children who are considered for special programs in science, and a variety of identification methods and devices should be employed.

Successful programs for the gifted in science are characterized by certain salient features including the following: a wide variety of materials and resources are made available to the children; the regular program is not just accelerated to give gifted children the same instruction in a shorter period of time—rather the program is *enriched*; the gifted child is identified early; emphasis is placed on reading; the child is encouraged to pursue problems of special interest to him; science activities provide opportunities for the development of the qualities of leadership; the child is encouraged to relate the science he learns to the life he lives but he is not required to do so—he is allowed to be as theoretical and abstract as his imagination dictates; science clubs and other out-of-school activities are used to maximum advantage; the special science program for the gifted has a stimulating effect on the total school program.

The research that has been done in giftedness relates largely to the social adjustment of the child and to the formation of attitudes. Little investigation has been carried out for the purpose of determining how successful certain specific practices and procedures are in terms of pupil growth in a particular subject, such as science. The great need for research lies in that area.

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CHAPTER SIX

Contemporary American culture has been called both an era of scientific progress and an age of domination by gadgets. Whatever it is called, the processes and products of science have been a major factor in shaping it.

Secondary School Science

ALFRED T. COLLETTE

AND

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THE BASIC PROBLEM

Both those who admire and those who are suspicious of American technology have, in the recent past, launched attacks against the education which future scientists receive in the public schools. On the one hand are those who stress the education of scientists as *necessary for the expansion of the society*. Since individual achievement in science requires *both* above-average intellectual ability and the development of science ability to the fullest extent, the schools have been attacked for failing to provide a special science education for the gifted student.

Other quarters, however, see other sides to the problem, and from these quarters,

as a sort of counterpoint, come other criticisms. "The schools," the argument runs, "place too much emphasis on science. It is most important that the gifted student receive a good, sound, liberal education, in which science is paid only its just share of attention, and which teaches the student to take his place as a leader of society." In these quarters, frequent mention is made of the political naïveté of some scientists. Quotes from scientists who have expressed opinions in fields other than their own are also frequent, when that scientist has, in the process of venturing the opinion, revealed a profound ignorance. This argument also has some elements of truth. Scientists are sometimes politically uninformed and are exploited by others. They are sometimes intolerant of fields of learning in which facts cannot be established by observation and experiment.

The administrator who is planning a program of science education for the gifted student must, of necessity, take note of both arguments. But how is he to decide which argument has the greater force? Should he listen to the one, and stress science at the expense, perhaps, of other areas of the curriculum? Or, should he listen to the other, and adopt the criteria of education for leadership or education for life which, among others, have been proposed? Probably the most practical and efficient solution to the problem may be arrived at if first, the special needs of the future scientist are considered, and second, these needs are related to the particular circumstances of a high school education.

In the most realistic terms, a reasonably successful and happy human being should possess both vocational and social competence. Again in general terms, vocational competence depends on a knowledge of the subject-matter of the field, the ability to use the tools of the field, and the development of the skills which the field requires.

Obviously, the public schools can never be responsible for the development of the vocational competence of a scientist in anything like the sense in which they can be responsible for developing that of, say, a secretary or a mechanic. Thus, the job of the schools in educating the future scientist is to give him the sort of education which will most facilitate his acquisition of vocational competence in his higher education.

Opinions vary, of course, as to the methods and processes which will best attain this objective. Traditionally, the approach has been through subject-matter—the most able students are taught the most difficult material, and so on down the scale. The place of subject-matter is still the subject for much of the most vitriolic debate in matters educational. In reading current attacks on public education, one receives the impression that the high schools, according to the individual writer's persuasion, should teach the gifted child calculus, the physics of nuclear submarines, organic chemistry, airplane piloting, mulch farming, and advanced political economy. At the other end of the spectrum of opinion is the conviction that

nothing is as important as teaching the child to *THINK*, and that this may be done without teaching "mere information—" a term used with roughly the emotive connotation of "dead fish."

An instructive example of the still great influence of this subject-matter orientation may be drawn from the recent revision of the New York State Physics Syllabus. In this revision, the fluid mechanics unit, including bouyancy, water displacement, density, specific gravity, and fluid pressure was relegated to the Optional Materials division. In its place was inserted a long and comprehensive unit on electronics. A great deal of dissent was provoked by this revision. Many of the state's physics teachers both at the high school and college level argued that the basic definitions and physical principles thus summarily dumped on the academic scrap heap contributed greatly to the student's understanding of the nature and properties of matter, while the material on electronics smacked suspiciously of trade school material which would, soon after the student's graduation, be obsolete.

On the face of it, these arguments have a good deal of force. After all, Archimedes' principle is one of the basic physical principles, and specific gravity is a fundamental property of matter. Certainly, also, the rapid development of semi-conductors will probably render triode amplifiers and diode rectifiers obsolete in a few years.

The argument needs closer inspection. Among the topics treated in the old syllabus were the lift pump, the force pump, and the hydraulic press. These machines, at least in the form in which they were presented in elementary physics, are now statistical oddities. What reason, therefore, is there for teaching these machines instead of a triode amplifier? Similarly, is there any reason for the statement that density is a more fundamental property of matter than thermionic emission? Faced with these questions, the defendants of the old syllabus were often reduced to making the undeniable statement that the Greeks knew about density but not about electrons.

The point, of course, is that the subject-matter which the schools can teach is relatively unimportant if compared to the subject-matter which the practicing scientist must know. One must look elsewhere to assess the importance of subject-matter.

The real utility of subject-matter in high school science courses lies in the foundation which it forms for the development of the intellectual skills which are the distinguishing mark of the scientist. These skills include the ability to observe accurately and report on these observations, to draw conclusions from observations and to project these conclusions into new situations, to formulate theories from observations, and many others. Evidently, these processes cannot be carried on in a vacuum, so to speak—some facts are necessary for the development of these abilities. This is true

for two reasons: first, these facts are necessary as a beginning point. A person cannot think cogently about either specific gravity of an object, or the circuit applications of a diode unless he knows something about these topics. Secondly, practice in these intellectual skills requires facts on which they may be applied. It is possible to make both too much or too little of subject-matter content of science courses. Too much is made of subject-matter when it is regarded as an end of itself, when it is insisted that students be able to tape-recorder-like repeat the material which has been presented by their teacher. Too little is made of it if the development of scientific skills is neglected and if it is not realized that the development of these skills comes about only through practice on the scientific body of knowledge.

The previous discussion of subject-matter and skills is not, of course, applicable only to the education of the gifted. What, now, is true in the case of the gifted science student? Primarily, the gifted student is able to develop the intellectual skills described above to a very high degree. His instruction, therefore, should be aimed at this development. Since subject-matter contributes to this development, he needs a thorough grounding in the fundamentals of scientific knowledge. Since his ability to understand and to make abstractions is greater than that of the average student, this subject-matter may and should be presented at a higher level of difficulty, and the generalizations drawn from it may be at a higher level of abstraction. At the same time, he should be given a wide variety of experiences in which he may practice and develop his abilities to observe and abstract. The remainder of this chapter will be devoted to a discussion of the means and methods which may be employed to insure that the gifted child has this opportunity.

THE GIFTED SCIENCE STUDENT

Traditionally, the gifted student has been defined as a student whose intelligence quotient is 140 or greater. Practically, adherence to this definition in all except the very largest schools is an impossibility because the distribution of intelligence is such that only about one per cent of the population will reach or exceed this figure. Inclusion of a student in a program for gifted students should not, therefore, be based on intelligence alone. There is a certain practical justification for this reasoning: A student whose I.Q. is, say, 120 and above is capable of becoming a competent scientist or engineer. If this student has an interest in science and, more important, willingness to devote his time and effort to science, he will benefit greatly from being in a special program.

Some traits of the gifted science student have been described. According to Paul Brandwein, who developed an outstanding program at the Forest Hills High School, the characteristics of these students include:

1. Outside of school the majority tended to individual sports—tennis, cycling, fencing, walking. Very few in team sports—basketball, baseball, football.
2. A major part of the time spent in reading and other intellectual activities, homework, listening to music, school club activities. Minor, although significant, amount of time in social activities such as dancing.
3. A major part of time in self-initiated, individual projects—astronomy, "ham radio," stamp collecting, classical music, learning foreign languages, musical instruments.
4. Tendency to classical music, chess, bridge, and serious reading of classics (Dickens, etc.), do crossword puzzles and acrostics.
5. Tendency to read serious magazines; *Harper's*, *Time*, *Scientific American*, *Saturday Review*.
6. A tendency to go to movies less than once a week. Tendency to go to the theater.
7. Activities joined in school more of discussion type—Language Society, Problems of Civilization, Science, Chemistry Club, school paper, school magazine.
11. Vast majority buy books for personal library.
14. Almost never get into difficulty with teachers or are disciplinary problems in school over school work. May disagree with teachers over interpretation of subject-matter.
15. Almost all the parents in this group possessed of a post-high school education. More than half are graduates of colleges. A high number from graduate schools (Ph D., M.D., Law, Engineering, Accounting). A high minority in professions.¹

In addition he states, "In general, there was one personality characteristic which seemed almost obvious. The youngsters in the experimental group as compared with the 'norm' of behavior at Forest Hills might be said to be more quiet, more reflective, more inward-looking; in short they exhibited, in general, a tendency to introversion, as compared with the norm."²

Results of other studies, including those of MacCurdy,³ who studied finalists in the Westinghouse Science Talent Search, and Roe,⁴ who carried

¹ Paul F. Brandwein, *The Gifted Student as Future Scientist* (New York: Harcourt, Brace and Co., 1955), pp. 56-57.

² *Ibid.*, p. 56-57.

³ Robert D. MacCurdy, *Young Leaders in Science and How They Develop* (paper read at Atlanta meeting, American Association for the Advancement of Science).

⁴ Anne Roe, "A Psychological Study of Eminent Psychologists and Anthropologists and A Comparison with Biologists and Physical Scientists," *Psychological Monographs*, Vol. 67, No. 2 (1953).

out a psychological study of eminent scientists, are in general agreement with this picture. Interestingly enough, both Brandwein and Roe found that the gifted science student is quite likely to be either the first child or the first son in a family.

Both the nature of an interest pattern of the gifted student and his superior ability in generalization may contribute to an uneven development. Such a student, for example, may have an excellent knowledge of both theoretical and applied electronics and be deficient in other fields of science. This difficulty is accentuated by the fact that these other fields of science are often uninteresting to the gifted student even though they may contain fundamental scientific principles which will be necessary to the student in future work. A teacher, therefore, often faces the problem of "gap-filling" in working with the gifted student.

Also, not infrequently, the gifted science student neglects other areas of learning, sometimes regarding them with a shade of contempt. He is sometimes inclined to accept science uncritically as the answer to all problems. He may be impatient with slower students, which, incidentally, leads to the social difficulties that are often important in the development of the gifted.

The Science Needs of the Gifted

In science, as in other curriculum areas, the basic problem in dealing with the gifted child is providing an education which will encourage him to develop as rapidly, intensively, and extensively as possible. In science, this means specifically: (1) opportunity to learn the subject-matter of the field, presented in sufficient depth and breadth to stimulate and challenge; (2) opportunity to develop the intellectual and manipulative skills of science; (3) provision for proper guidance and direction.

The starting point in science education is the core of information with which it deals. The higher objectives of science teaching—the development of skills, attitudes, and appreciations—all are impossible unless the student has at his disposal the body of knowledge which constitutes the product of the scientific process.

In the scientific education of the gifted, the problem is seldom one of persuading or motivating the students to learn the subject-matter. Typically, gifted science students are eager to learn. The problems dealing with subject-matter are twofold: the first is to provide a variety of subject-matter of a difficult enough nature to challenge the student. At the same time that a sufficient level of difficulty is necessary, the second important problem requires that particular attention be given to the gifted science student's background in the fundamentals. The gifted student is very likely to be impatient with what he considers easy stuff and is in a hurry to get on to

more advanced work. At the same time, the gifted student is very likely to specialize, even at a fairly early age. Although this is not, of itself, a bad thing, it may result in the gifted student's neglecting certain areas of science, which may act to his disadvantage at some later time. The teacher, therefore, has some responsibility in seeing that the students pursue learning in the science areas outside their special interest.

To summarize: The gifted student needs first a thorough grounding in the fundamental subject-matter of science. In particular, he must realize the importance of the theoretical basis of science, and he should also be made aware of the importance of scientific fields other than the one in which he is interested. In the more advanced sciences, subject-matter of sufficient scope and adequate difficulty level to stimulate the student must be presented.

Of even greater importance than a knowledge of subject-matter is the development of skills which are essential in science. These skills are both manipulative and intellectual. In the former class are the abilities to perform the standard laboratory operations, to use measuring devices, and to make careful records. In the latter class are the abilities to observe carefully, to draw conclusions from observations, to apply these conclusions to the generalization of principles, and to apply previously learned knowledge in new situations.

None of these abilities spring to life full-grown, even in the gifted student. They are developed only if first, they are taught and second, they are practiced. Provision of such opportunity for learning and practice is one of the most important functions of the school in the education of the gifted student.

Guiding the Gifted Student

The gifted student needs direction and guidance. The same statement is of course true of all students in a school, but the direction and guidance of the gifted science student has its own problems.

A major area in which the gifted science student needs guidance is in social adjustment to those of average abilities. A great deal has been written, both pro and con, about life adjustment. Many argue that the school's emphasis on adjustment is really breeding conformity and killing imagination. Nevertheless, the scientist must live in a world populated with other people, and his relations with them can be a source of concern to him. This is particularly true when it is remembered that the interests and activities of the science-gifted student are of a nature which tend to isolate him from his classmates.

The gifted student's teacher can help him, to some extent, to establish a satisfactory relationship with the other students. It is not at all unusual

for the gifted student to look to his science teacher for personal advice. On these occasions a little informal counseling may be of value. Further than this, through assigning the gifted student to group work and to situations where interaction with other students is necessary, the teacher can contribute to his ability to communicate and associate with other students.

The gifted student is often sure that science will be his vocation at a fairly early age. Vocational counseling for the gifted frequently involves, however, the selection of a suitable science field. The science teacher is often in a position to supply the information which will make such a choice possible. The science teacher, for example, may observe that a certain student is both interested and talented in science but is deficient in mathematical ability. Such information is, of course, of great importance in planning the student's future education and career.

Finally, we must remember that the gifted student is still an adolescent, and although he may differ outwardly to a great degree from other adolescents, he still has many of their needs and problems. He may, for example, require a certain amount of non-stringent supervision in his project work, as suggested by Brandwein. He may also be affected by the growth periods of adolescence. Wise guidance at this time is essential.

CURRENT CURRICULUM PRACTICES

Although many kinds of curriculums may be found in schools which attempt to provide special science education for the gifted student, these curriculums generally fall into one of two classes: the enriched curriculum and the special curriculum.

The Enriched Curriculum

In many ways, the problems associated with educating the gifted student are most severe in schools where classes are not large enough to make homogeneous grouping possible. The provision of special learning situations, consisting of special materials and opportunities for the gifted student, is often called *enriching* the curriculum.

According to Thurber and Collette, when a gifted student is found in a heterogeneous group, he needs special activities:

Special pains must be taken to make sure that the brilliant pupil is not ignored. It is far too easy to hold him to the same assignments and to the same standards as his classmates, assuming that because he attains high grades nothing more need be done for him.

It is a mistake to believe that brilliant pupils must be held back by being in the company of less gifted pupils. Pupils are held back, not by their classmates, but by stereotyped and inflexible classroom procedures.

The program for the brilliant pupil should be a judicious blend of regular class work and special assignments. He should work with his classmates on the introductory phases of each unit, he should participate in all field work, and in much of the group work. But while other pupils are doing individual work—reading, reviewing, and writing—he should be engaged in activities that are suited to his superior abilities.²

The teacher who has been faced with the problem of providing a suitable science education for one or two gifted pupils in a regular class will agree that this is one of the most taxing tasks a teacher can face. The following illustration, drawn from an actual situation, serves to point out the problems which these students pose:

Alice was the only gifted pupil in Mr. Wilson's biology class. Her grades were outstanding: she appeared to obtain these grades, however, with a minimum of effort. In class, Alice's behavior was satisfactory. She posed a certain problem, however, in that her questions, which were highly intelligent and revealed a great deal of insight into the subject-matter, required a great deal of class time to answer. During this time, the other class members tended to become restive, since the questions were frequently beyond their level of comprehension. Mr. Wilson, therefore, found himself tending to answer her questions rapidly and superficially, which was unsatisfactory both to Alice and to himself.

Mr. Wilson knew that the answers to many of Alice's questions could be found in college-level texts. Therefore, he loaned Alice several of his college texts. During class periods, while the other class members were reading the daily assignment, Alice was allowed to read in the advanced books. She was also allowed to take the books home, and read in them during her spare time.

As a result of her readings, she became interested in heredity before this was treated as a class topic. Mr. Wilson procured some fruit flies, and during after-school hours instructed Alice in the techniques of caring for and breeding these flies. After the colonies had been satisfactorily started, Alice was given the responsibility of caring for them. This she did very satisfactorily. At the same time, she made various crosses, and recorded the results of these crosses.

In the course of this project, Alice became interested in the ways in which mutations were produced in fruit flies. Mr. Wilson was able to secure the cooperation of a nearby university, which maintained a radiation biology laboratory. Alice was allowed to visit the laboratory, and

² Walter A. Thurber, and Alfred Collette, *Teaching Science in Today's Secondary Schools*, page 445. Copyright 1959 by Allyn and Bacon, Inc., Boston, Mass.

watch the experiments in progress. The laboratory head agreed to allow Alice to bring in colonies of fruit flies for irradiation. Thereafter, Alice concentrated on observing the results of this irradiation.

In the spring of the year, Alice entered her project in the local science fair, where she won a prize in the biology talks classification.

Alice's case illustrates some of the problems which may arise with the gifted child in the regular classroom. In the first place, the gifted child in the regular classroom seldom, if ever, works up to capacity. Even though Alice's grades were outstanding, she was not achieving the level of which she was capable.

Secondly, Alice presented something of a class problem. Although in her case no deliberate malice was involved, her questions, nevertheless, caused some class disruption.

Alice was fortunate, however, in having Mr. Wilson, a conscientious and able teacher who was able to plan and carry out for her a special program within the framework of the regular class. The following techniques which Mr. Wilson used are of special interest:

1. *The reading program.* Mr. Wilson was able to reduce the class time spent in answering Alice's questions and at the same time to provide a more thorough answer to her questions through the development of a suitable reading program. Such a program is a very useful device in providing for the gifted. It should not, however, consist of handing the student an advanced book to read and trusting to luck from that point. Rather, the reading should be planned with the student and organized around some topic of special interest to the student. These readings may be used, as Mr. Wilson used them, to replace the regular class assignment. In some cases asking the student to submit a report on the readings completed may be wise.

2. *The special laboratory program.* Mr. Wilson had two purposes in assigning the work with fruit flies to Alice. In the first place, he hoped to help her develop her laboratory skills of a special nature that were of interest to her and, at the same time, to provide her with an opportunity to learn some topic at a challenging level. Although he did not, Mr. Wilson could also have asked Alice to present some of the material on genetics to the class when the regular class reached the topic, using her fruit flies as materials for illustrations.

At the same time, he was able to start her on an independent research project, one of the most valuable devices in dealing with the gifted student in the regular class. Mr. Wilson was fortunate enough to be able to secure the use of the laboratory facilities which are not found in high schools in general. Even if this had not been the case, however, Mr. Wilson and Alice

could have worked out a project with available equipment. Note that Mr. Wilson insisted that careful records be kept of observations. One of the reasons for a project of this type is the practice it gives in methodical observation and record keeping.

3. *Laboratory visitation.* Mr. Wilson arranged an individual trip to a laboratory specializing in the field in which Alice was interested. Such trips are often of great value for the gifted student.

4. *The science fair.* Finally, Alice entered her project in a science fair. Participation in such fairs and congresses is a valuable activity for the gifted student. Often such participation provides motivation and stimulates the student to complete a project. The student gains the valuable experience of speaking in front of a group and may profit from his contact with the work of other gifted students.

Other techniques are, of course, possible in dealing with the gifted student in the regular class. The gifted student may, for example, assist in preparing and presenting demonstrations. He may be assigned the leadership of groups working on special problems. The observant teacher will use many other possibilities which arise in the particular classroom, as the basis for special activities for the gifted child.

One pitfall should be mentioned, however, in attempting to use an enrichment program for the gifted student. Only too commonly, teachers interpret enrichment as the assignment of extra work for the gifted without materially increasing its scope or difficulty. Such assignments as extra problems from the same textbook or reading about the topic in other high school textbooks often represent only an effort to keep the gifted student busy. We cannot emphasize strongly enough that the entire success of any enriched science program depends on the individual teacher's willingness to accept the grave responsibility which having the gifted student in a regular classroom imposes on him.

Science Clubs and Science Fairs

As a substitute for a special class, a science club may be formed. Such clubs can provide the opportunity for individual research projects, and they may serve to bring the gifted students in different grades and courses together where each will benefit from contact with the work of the others. The primary basis for organization is an interest in science. Because of the wide variety of interests which are expressed by the students, a resource committee, in addition to the teacher of the group, is necessary. The resource committee should be comprised of other scientists—high school teachers, college consultants, and members of the community.

The science fair is increasing the interest in science and alerting the public to the high potential of the students. Although one may question

the practice of extensive publicity which accompanies the fair, there is no doubt of its basic value in stimulating interest.

The Special Program

In schools large enough to have a substantial number of gifted students, the special science program is probably the best approach. In essence, the special science program involves establishing homogeneously grouped classes in which the subject-matter is presented at an advanced level, the tempo of presentation is accelerated, and adequate provision is made for independent activities. Thurber and Collette say:

If maximum help is to be given to pupils with high scientific aptitude, a special program must be provided. . . . The values of the special programs have been amply demonstrated in several schools The caliber of instruction can be kept high; pupils can be challenged with high-level problems; the teacher can spend more time on positive guidance and less on awakening interests and reinforcing learnings; and the pupils tend to stimulate each other.⁶

Courses in the Special Program

The first step in setting up the special science program might well be departmental organization for the program. In large enough schools, a separate, special science department might be organized within the framework of the existing science department. The department head, who would also probably be a teacher in the program, would be responsible for the administration of the special classes, as well as for curriculum coordination and for teacher supervision. Even if the school is not large enough to allow such a department for science alone, various combinations are possible: a science-math class department, for example, or even a single department responsible for special classes in all subjects, which would work closely with each of the academic areas.

Such a department would have, initially, two most promising lines of action: providing special sections of existing course offerings, and providing new course offerings at an advanced level.

The curriculum of the special section, based on that of the regular section, is distinguished from it by added depth and breadth of study. In states where a state-mandated syllabus for the sciences is provided, this syllabus might serve as a starting point later to be supplemented as time and opportunity permit. Again it should be stressed that increased depth is as important, if not more important, than increased breadth.

⁶ Walter Thurber and Alfred Collette, *Teaching Science in Today's Secondary Schools*, page 451. Copyright 1959 by Allyn and Bacon, Inc., Boston, Mass.

The special subject course is an addition to the regular science curriculum, and may either supplement the standard curriculum or replace one or more of the courses in it. Such courses are normally offered in the eleventh and twelfth years, and may include advanced physics, chemistry or biology, as well as such subjects as astronomy, aeronautics, electronics, geology and other sciences.

Obviously these programs are not mutually exclusive and, indeed, a complete program for the gifted would take both approaches. A school, however, making its initial entry into the field of special science education for the gifted might do well to consider the special section plan. This offers the least disturbance of the school's functioning, can be set up with a minimum of additional staff and materials, will present the fewest scheduling difficulties, and can reach the greatest number of students who will benefit from the program.

But however good the adoption of either or both of these programs may be as a beginning, it is probable that long-range planning requires a rather fundamental revision of the curriculum for the gifted. This country's practice has long been teaching the various science subjects in sequential yearly blocks, so that in the vast majority of cases general science or earth science is taught in the ninth grade, biology in the tenth, and physics and chemistry in the eleventh and twelfth. Several defects may be detected in this scheme, including the ample opportunity provided for forgetting the courses taken first, the lack of provision for advanced level courses in specific areas, and the inability to teach the subjects taken first at the same level as those taken last. Consequently it would seem likely that a truly complete program for the gifted student would be organized so that first, the student would enter at an earlier age than is now the case and second, would be provided with courses in specific science areas that extend through two or three years of the high school program.

In such a program, the student would, perhaps, begin his study of the biological science in the ninth grade. This might be followed by an advanced general biology course, or by specific courses in such subjects as microtechnique, bacteriology, anatomy and physiology, and the like. At the same time that he is beginning these advanced studies, he might start the elements of physical science, which in its turn would be followed by upper-level courses.

Some problems, of course, are to be expected in designing such a program. A staff of very high competence would be necessary. Obtaining the necessary equipment, materials and facilities might also be difficult. Then too, in order for the student to take the increased number of courses, it would be necessary for him to study more subjects than he is now doing. Considering the restricted number of subjects which the typical American high school student now takes, however, this would not seem to present any

problem. The objection might also be advanced that such a program requires a career commitment at an early age; that such specialization is foreign to the American ideal of a comprehensive education. Nonetheless, only some such provision will enable the gifted student to progress at the rapid rate of which he is capable.

The enrichment section plan often includes curriculum rearrangement. Certain subjects might well be given to the gifted student at an earlier grade level, making the twelfth year free for special subject courses. Two possible rearrangements which have been mentioned are:

PROGRAM I		PROGRAM II	
<i>Grade</i>	<i>Subject</i>	<i>Grade</i>	<i>Subject</i>
7	General Science	7	General Science
8	Earth Science	8	General Science
9	Biology	9	Earth Science
10	Chemistry	10	Chemistry
11	Physics	11	Physics
12	Special Subjects	12	Biology or Special Subject

Once the special science program is well established, the possibility of scheduling students into programs that prepare them for a scientific occupation in the physical or biological fields might be considered. Such a schedule would present advanced courses in these areas, which the student would take instead of the introductory course in the other area. In such a program, a second year of physics, chemistry, or biology would follow the introductory course. Of course, a student can take two science courses in the same year if the rest of his schedule permits. Thus the four-year program for such a student might include five or even six science courses.

In these arrangements, the general science courses include topics from all areas of science. Earth science includes the study, generally, of meteorology and climatology, physical and historical geology, and astronomy, with special reference to the Earth considered as a planet. Chemistry includes the study of matter, and particularly its behavior as an element or in combination with other substances. Physics is primarily the study of the various forms of energy, and the relationship between matter and energy.

Methodology for the Special Class

The methodology suitable for use in the special class is not greatly different from that used in regular classes. Rather, the same activities which are used in the regular science class may be suitably modified for special class use. The necessary modification is primarily the provision of activities which lend themselves to a greater depth of study, rather than the

provision of a greater quantity of activities intended to cover more material than the regular class at about the same level of difficulty. The activities and methods which are used should lead to greater conceptual development opportunities for the analysis of the scientific principles underlying the activity, and practice in applying the principles learned in new situations.

The activities going on in a regular classroom, therefore, would differ little in outward appearance from those seen in a special class. Certain methods, however, are more suitable for special class use than are others. These will be discussed under the following headings: in-class activities, out-of-class activities, and laboratory activities.⁷

In-Class Activities

The lecture-demonstration, the film, the field trip, and the other activities found in a regular classroom are also found in the special classroom. The differences between these methods as used in the special and in the regular class lie in the amount of student participation both in planning and in carrying out these methods. Gifted students, for example, are quite capable of carrying out a demonstration which will be of great value both to themselves and to the class. Then, too, they are capable of accepting much more responsibility for the planning of the classroom activities. The resource person or guest expert is likely to be of more use with the special class.

A method of extreme value in the special class is using questions which arise as the basis for experimentation and research. A question, for example, may be answered by performing an impromptu experiment by dividing the class up into groups and allowing each group to work on the problem. Similarly, questions which arise in class may be answered by assigning the problem as a research task to an individual or a group of students, to be completed and reported to the class.

Laboratory Activities

The gifted student requires extensive, high-grade laboratory experience. High-caliber laboratory experience is probably the most important single factor in the science education of the gifted because only through laboratory experiences are the intellectual skills necessary for success in science actually applied.

At all costs, the laboratory for the gifted should avoid the popular "cook-

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book" approach found in many of the commercially available laboratory manuals. Most emphatically, he should work with principles rather than always follow formalized experiments. *The gifted student needs problems* that will stimulate him to think originally and critically. Of course, he need not work only with problems to which the answer is not known. He needs to be given the responsibility for designing the method to solve a problem, and to be able to criticize his method and analyze any differences between commonly accepted values, if available, and the values which he obtains.

The *blank-sheet* laboratory is probably the best technique for special classes. The student, in this approach, is given only the problem. The laboratory materials and supplies are made available, and he is, from there, on his own. Completion of the experiment at the end of a standard laboratory period should not be insisted upon. Supervision and suggestions should be kept to a minimum; give only enough guidance to insure continued effort. The following illustration shows the use of a blank sheet laboratory method:

Mr. Benson's physics class was studying accelerated motion. The laboratory experiment for the week was the determination of the value of the acceleration owing to gravitation

During the class period preceding the laboratory, Mr. Benson initiated a class discussion, in which possible ways of determining this constant were discussed. Some of the suggestions were: measuring the swing of a pendulum, timing a falling object, and measuring the acceleration of an object rolling down an inclined plane. Mr. Benson was careful not to tell the class which of these methods might or might not work. Instead, he divided the laboratory sections into groups, each assigned to a specific approach.

During the laboratory period, Mr. Benson visited each group, and commented on the work of each one. The "falling object" group reported that the values it determined fluctuated highly, although they averaged somewhere near the correct value. Mr. Benson discussed the possible reasons for this fluctuation with them, and helped them devise a method to overcome this.

He repeated this process with each of the experimental groups. At the end of the laboratory period, the class reassembled, and reported on their experiments. The "rolling object" group reported consistent results but results which were well below the accepted value. The rest of the class attempted to suggest reasons for this. One class member suggested that perhaps a rolling object did not accelerate in the same fashion as a sliding or falling object. Mr. Benson asked if there were any students who would be interested in checking this hypothesis. The student who had made the suggestion volunteered, as did two other students. Mr. Benson suggested

that they get together outside the class period and *design* their experiment, which they could perform during the next laboratory period.

Mr. Benson's apparently easy-going and informal laboratory procedure was actually the result of careful preparation and thought. The following points of interest about his management of the laboratory should be noticed.

- (1) The weekly experiment was preceded by a class discussion. During this period, the problem was stated and discussed. Possible methods of solution were not stated but were, instead, suggested by the class. If the class had not suggested methods, Mr. Benson would have prompted such suggestions, but, as much as possible, he had the class determine methods.
- (2) Mr. Benson did not use one of the commercially published laboratory manuals. Rather, he handed out duplicated sheets which contained only the problem. The students themselves were to fill in the method which they used, their observations, and their conclusions. By this procedure he stimulated original thoughts about the problem, rather than simply fostering mechanical performance of a prepared lab sheet.
- (3) Mr. Benson guided, rather than supervised, the laboratory groups. Through this type of control, he was able to insure that the groups kept at work at the problem, but he allowed them to work out their problem with a minimum of direct instruction.
- (4) Although Mr. Benson realized that two of the three groups were using methods which were unlikely to lead to the correct answer, he allowed them to *continue*. By this method, he encouraged analysis of the method, in order to discover the reason for the disagreement between laboratory results and the accepted value.
- (5) Mr. Benson used the discrepancy between the accepted value and the laboratory results to stimulate students to design a refined experiment and to do further research. Note that he substituted these experiments for the scheduled exercise of the next period.

The individual laboratory research project is also of extreme value. Such projects need not be original, in the sense that the answer to the problem is not known. They should, however, represent original thinking on the part of the student and should be carried out in a systematic fashion. Students may also, of course, carry out projects which are true research. The Future Scientists of America Foundation lists the following projects, which were carried out by high school students.⁸

⁸ *Encouraging Future Scientists: Student Projects* (Washington, D.C.: Future Scientists of America Foundation, 1954).

The Determination of the Optimum Acidity for the Separation of Mn, Zn, Ni, and Fe by Paper Chromatography—Using Whatman's 3mm filter paper, developer of 4N hydrochloric acid and acetone, a solution of alcohol and 8 quiniol and a range of Group III H chlorides, the separation of the ions in various pH solutions could be observed.—Eleanor Millard, Austin H. S., Austin, Texas (2nd, 1954).

A Study of the Thermal Reflectivity of Certain Metals—Five 1-liter beakers were used. One was plated with gold, one lined with gold foil, one plated with aluminum, and one lined with aluminum foil. A thermocouple recorded temperature inside each when inverted over a 250 watt infra-red bulb for five minutes. Temperatures ranged between 250° C for the plain beaker to 600° C for the gold plated one.—Richard Estes, Brown H. S., Atlanta, Ga. (2nd, 1954).

Simon, The Thinking Machine—Using a binary number system, information on a punched paper program tape and fifteen registers each made up of two relays, "Simple Simon" can do four operations—addition, negation, greater than, and selection—Irving Thomie and Janice Hopkinson, Thomas Willett School, Attleboro, Mass (1st, 1954)

Temperature-Sensitive Compounds—Knowing that certain compounds change colors at definite temperature changes, an attempt was made to produce new cobalt salts with new color change temperatures. Being reasonably successful, the project is being extended to include "the lutidines, collidines, cyclohexylamines, hydrazines, and selected aliphatic and aromatic bases and other salts such as those of nickel, chromium, iron, manganese, and copper in place of cobalt salts."—Marian Bennett, Newtown H. S., Elmhurst, New York (1954).

Control of Electrolyte Corrosion—It is well known that magnesium will be corroded instead of iron if both are in the corrosion zone, thereby protecting iron pipes. In some cases, magnesium rods cannot be used. This problem created the hypothesis—corrosion of iron can be decreased by connecting the negative pole of a source of direct current to the corrosion area. Carbon was used as a positive pole. Hypothesis was confirmed—Harry Allen, Kenmore Senior H. S., Kenmore, New York (1953)

Removal of Rust by Electrolyte Process—This project was prompted by shortcomings of sand-blasting, grinding, and acids as methods of rust removal. The hypothesis was—if solutions such as sodium chloride are electrolyzed with the cathode being a rusted object, the hydrogen emitted there will remove the oxygen from the oxide, leaving the metal free. Accompanying diagrams show effective apparatus designed to expedite the project—Curtis Westley, Central H. S., Aberdeen, S. Dak. (2nd, 1954).

Out-of-Class Activities

Voluntary and independent activities carried on outside of class are of very great value in the development of the gifted student. The research projects already discussed may well be included in this category, since the gifted student will spend many out-of-class hours on his project. Other activities, however, are possible.

One of the most fruitful of these is the reading program. Such readings may be a survey of the literature related to an individual topic. They may be planned around a topic of special interest, or they may be used as a supplement to class assignment. Often, school libraries cannot afford the sort of reference works which would be of value in these circumstances. Frequently, university libraries are asked to cooperate in providing reading opportunities. Many highly significant reference works are available in paperback editions at low prices. The Federal government sponsors a traveling science library, from which books may be rented at a very low price. Field trips, properly planned and executed, are of great value to the gifted students, as are industrial visitation.

Planning for the Special Class

One of the dangers inherent in the special class is the possibility that it can be used simply to cover more material than the regular class, at about the same level of difficulty. The learning abilities of the gifted student are directed in this process simply at the mastery of a greater quantity of subject-matter, without any attempt to develop greater understanding.

This danger is most easily avoided through careful planning at the time of initiation of the course. The teacher who is to be the instructor must consider the resources available to him, the activities which will be of greatest benefit, and the types of units which will contribute most to the development of his students.

UNIT ORGANIZATION

Two types of units will be discussed as examples of unit planning for the gifted student. These are (1) the project-centered unit and (2) the core-extension unit.

The Project-Centered Unit

The project-centered unit is, essentially, a method of making use of the gifted student's capacity for individual work. The teacher and individual students or student groups select problems, which are individual parts of a larger problem, and through the presentation of these projects to the class develop the larger concept with which the course is concerned. For example:

Mr. Daley's earth science class was studying the process of erosion. During the first class session, Mr. Daley introduced the general topic of erosion and began treatment of agents and processes of erosion.

At this point, the class was divided into sections. One section agreed to study and present the effect*of running water; another was to study the effects of glaciation. A third was assigned the presentation of wind as an agent of erosion. Mr. Daley himself was to present the effects of gravity as an eroding agent.

Near Mr. Daley's school were several areas of geological interest. In the immediate vicinity of the school there were drumlins and a plunge basin lake. At a somewhat greater distance was a terminal moraine with a moraine lake, and at about the same distance in another direction were several good examples of eroded gorges.

Both in-class and out-of-class projects were started. During class time, the running-water group began the construction of a sand table set-up to study the effects of water on various soils. The glaciation group began a reading and reference project, as did the group studying the effects of wind. One member of the latter group suggested that a dynamic model of wind erosion, similar to the sand-table model, might be constructed using an electric fan and various possible materials to represent the earth. As a result of this suggestion, he and another member of this group began work on such a model.

Mr. Daley was able to arrange field trips for the whole class to the drumlin area and to the plunge basin lake. The distance to the other areas made field trips for the whole class unfeasible. However, Mr. Daley contacted the parents of several members of the glaciation and the running-water groups and was able to arrange transportation and supervision for these groups to visit the areas of special interest to them. Members of both groups agreed to take photographs in order to report to the class.

At the end of three weeks, the groups were ready to report. Each group was assigned two class periods for reporting. At the end of the report, the other class members criticized and asked questions. Mr. Daley kept careful track of the reports, and at the end of the reporting session he was able to present material related to the topic which the group members had missed.

Not all topics, of course, may be suitably treated by the project-centered unit. Highly abstract or technical topics such as atomic energy and similar topics, for example, do not permit a variety of experimental projects. But where a topic does permit experimental activity and where references are readily available, the *project-centered unit* is a possible teaching method. The projects should be capable of completion in a relatively short time, and they should contribute in quite direct fashion to the understandings being developed.

The Core-Extension Unit

The core-extension unit in some respects resembles the project-centered unit and, in fact, may follow such a unit as a logical corollary. The core-extension unit consists of class development of the essential material of

some topic, followed by individual exploration of other aspects of the topic.

In planning the core-extension unit, the teacher and the students first inspect the material in the unit and then decide what part is essential for the whole class. They also, at this time, plan the possible extensions or additional topics connected with the unit. The teacher then teaches the core unit by whatever methods seem most suitable for its presentation. At the end of this time, the extensions may be assigned. These may be in-class projects. They may also, however, be out-of-class individual projects, which the student works on in his spare time. Obviously, a wider choice of projects is possible if the extensions are out-of-class projects.

Examples of Unit Planning

An instructive example may be drawn from the ways in which the various unit-planning techniques may be applied to a single topic—alternating current and electronics. As a basis for this example, the New York State Physics Syllabus outline is given:

ALTERNATING CURRENTS AND ELECTRONICS

1. Alternating current circuits

A. Measuring AC

- *1. Effective values
- 2. AC meters
- *3. Ohm's Law

B. Inductance

- 1. Induced e.m.f.
- 2. Inductance
- 3. Factors determining current

C. Mutual induction

- 1. Induction coils
- 2. Transformers
- 3. Power transmission

D. Capacitors and capacitance

- 1. Dependence of charge on e.m.f. and capacitance
- 2. Factors determining capacitance
- 3. Effect of capacitors in DC circuits
- 4. Effects of capacitors in AC circuits

E. Resonant circuits

- 1. Transfer of energy between L and C
- 2. Frequency determined by L and C
- 3. Response to excitation

* Quantitative treatment necessary.

II. Vacuum Tubes

A. Thermionic emission

1. Effect of temperature
2. Directly and indirectly heated cathodes

B. Diodes and their construction

1. Rectifying action
2. Effect of plate voltage
3. Rectifier filters

C. Triodes and their construction

1. Effect of grid and plate e.m.f. on plate current
2. Amplification and amplifiers
3. Oscillators

III. Radio

A. The R F carrier

B. Modulation

1. AM
2. FM

C. Transmission

D. The receiver

1. Tuning
2. Demodulating
3. Reproducing

IV. Television

A. Frequencies used

B. Picture formation

1. Cathode ray tube
2. Sweeping
3. The formation of an image

For purposes of discussion, topics II, III, and IV—vacuum tubes, radio, and television—will be considered.

An inspection of the vacuum tube section will reveal that the phenomenon of thermionic emission may be used as a core for core-extension planning. The initial class periods, therefore, may be used in demonstrating and developing this concept. At this time, the first of the topics included in B, "Diodes and their Construction," the rectifying action of a diode, may be included because the inability of a vacuum tube to conduct current from plate to filament is basic to all further understanding of vacuum tube operation.

Three specific circuits may be used as class projects: the half-wave diode rectifier, the triode amplifier, and the triode oscillator. In addition, one project may be the determination of the characteristics of a triode. Note that each of these three circuits, if carefully constructed, may be used later in the topic in the construction of a small transmitter—the amplifier may be

used to modulate the oscillator and the power supply used to supply high voltage DC for both.

Many extensions are possible from this project-centered core. A few examples might be: *multi-element vacuum tubes, comparison of tubes and transistors, the photoelectric effect, circuit applications in guidance systems, and so on.*

The work done in circuit applications leads naturally to the next topic, *radio*. It has already been mentioned that the three pieces of apparatus assembled above may, through slight modification, be assembled into a small working transmitter although another stage of amplification may be necessary for successful modulation with a microphone or magnetic phonograph cartridge.

At the same time that one group is working on the transmitter, another may be constructing a simple receiver, again making use of the circuit applications learned in the previous unit. In this way the functions of the receiver may be learned.

Again, several extensions from this unit are possible. An advanced project might be the construction of a transistorized superheterodyne receiver, or a Citizen's Band (27.255 Mc.) radio-control transmitter and receiver. Television, evidently, does not lend itself as readily to activity-centered methods although a cathode-ray oscilloscope may be used to demonstrate many of the principles of image formation and production. Here, however, allied activities such as field trips or visiting lecturers may be employed.

The unit offers many possibilities for quantitative treatment. Inductive reactance, capacitive reactance, impedance, phase angle, and the mathematics of resonant circuits are all possible.

The completed unit, therefore, would be a project-centered core, with various extensions possible. It is given below in outline form.

Unit: Alternating Current and Electronics

Topic: Vacuum tubes

Core: Thermionic emission, construction and action of diodes and triodes.

A. Thermionic emission and diode action: teacher demonstrations.

1. *Effects of temperature: the emission of a filament is proportional to filament temperature.* Wire a 6H6 diode, including a milliammeter in the plate circuit and an ammeter in the filament circuit. Provide either a rheostat in the filament circuit, or heat it with an autotransformer, to vary the filament current. Show that as filament temperature increases, as shown by filament current, that plate current increases.
2. *Diode construction: Break away the glass envelope from old rectifier tubes. Obtain both cathode and filament types.*

IV. Plant Succession

A. Kinds of Succession

1. Primary succession
2. Secondary succession

B. Rate of Succession

C. Climax Regions of the United States

D. Shifts of Climaxes

V. Applied Ecology

A. Forestry

B. Range Management

C. Agriculture

1. Crop ecology
2. Land use
3. Land managements

D. Conservation of Resources

Below are some activities associated with this unit.

1. A transect is a sampling strip extending across a particular area. It is used most often in correlating two or more factors that differ between two points. For example, from a flood plain of a river to adjacent upland there would be marked changes in moisture conditions, and in such a place a transect may be useful for determining the range of moisture requirements of individual species.

2. Use sling psychrometer for determination of relative humidity to determine atmospheric moisture.

3. Use of hygrothermograph which automatically gives a continuous record of relative humidity and temperature of the air.

4. Use of weather station—minimum and maximum thermometers. Use of rain gauge—for measurement of precipitation.

The P.S.S.C. Physics Program. A special physics program of some interest has been developed by the Physics Science Study Committee. The course developed by this committee, led by Drs. Gerrold Zacharias and Elbert Little of M.I.T., is intended for the college-bound high school student.

Much of the traditional subject-matter of physics courses has been abandoned in favor of an exceedingly logical development leading to the concepts of electrostatic forces and quantum mechanics. The laboratory exercises, which are carefully integrated with the special committee-prepared textbook, make extensive use of simple, home-built apparatus. Throughout the course, emphasis is laid on the ideas and concepts of physics. Problem solving by formula substitution is minimized; special problems emphasize the ability to work with the ideas of physics as do the special tests developed by E.T.S. The College Entrance Board has also prepared special sections on its college entrance examinations for P.S.S.C. physics students. Several colleges and universities throughout the country, assisted by the P.S.S.C., have established training programs to supply the special training

required for the teachers of this course. Courses in biology and chemistry similar to the P.S.S.C. physics course are now in preparation and are expected to be released in the near future.

THE FUTURE OF SCIENCE EDUCATION FOR THE GIFTED

In the years ahead, the education of the gifted science student will become of increasing importance. If this education is to be accomplished, certain things should be done.

Training the Gifted Student's Teacher

We have long recognized that one class of special children—the handicapped and the retarded—require teachers who have had special training. The same recognition has not yet been extended to the teachers of the gifted student. At present, teaching the gifted science students is often a reward for faithful service, or rotation among members of a department is employed. The special demands made on the teacher of the gifted, however, should be recognized, and these teachers should be trained specifically for their job.

Adequate knowledge of subject-matter is, of course, one of the major requirements. This should constitute at least the equivalent of an A.B. degree and the teacher's major in a science area. In addition, graduate-level work in this area is desirable, particularly participation in research programs. The importance of individual research by gifted students requires that their teacher be familiar with research and its procedures. The teacher must learn how to initiate, design, and carry out a piece of original research.

The mathematical techniques necessary for each science should also be stressed. For the physical science teacher, this should include plane and solid geometry, plane and spherical trigonometry, advanced algebra, analytic geometry, and calculus through differential equations. The requirements for a biological science teacher need not be so stringent, but they should include a thorough grounding in statistical methods, including correlational techniques and analysis of variance.

A basic education in the humanities should not be neglected. This should include at least one course in composition and one in speech, work in philosophy including the philosophy of science, and at least three years of a language.

Certain professional courses should also be required. These might include a rigorous and carefully designed methods course, philosophy, and psychology of education.

3. Rectifying action: a diode will conduct in one direction only. Using the apparatus described above, reverse the high-voltage DC connections. The plate milliammeter will show no current.
4. Effect of plate voltage: plate current is directly proportional to plate voltage. Using the apparatus described above, vary the plate voltage. The plate milliammeter will show increased current.
- B. Student projects: thermionic emission and diode action. Students may use bread-board laboratory apparatus and construct a full-wave and a half-wave rectifier of the transformer-operated and line-operated types. They may be taught the use of a cathode-ray oscilloscope, and show the effect on rectifier wave-form of adding a filter to the circuit.
- C. Extensions to unit, for individual project use: construction of a mercury-vapor rectifier, of a silicon or selenium diode power supply; study of the effects on power supply operation of choke-input or capacitor-input filters, construction of a regulated power supply, construction of an electronic slide rule, using diodes.
- D. Mathematical correlations: Use of diode characteristics, designing filters for various frequencies.
- E. Triode construction and operation: teacher demonstrations.
 1. Construction of a triode: break away the glass envelope from some old triodes. Carefully cut the plate, and fold back to show grid construction and placement.
 2. Operating characteristics of a triode: Wire a triode, such as a 6J5 or a 6SF5, including a milliammeter and a voltmeter in the plate circuit with a potentiometer as a plate load; a potentiometer as a cathode-biasing resistor, and a voltmeter from grid to cathode. (A "C" battery may be substituted for the cathode-biasing resistor if shunted with a high-resistance potentiometer.) This apparatus may be used to demonstrate triode characteristics.
- F. Triode construction and operation. student projects. Students may use bread-board laboratory apparatus and construct a triode amplifier or oscillator or study the operating characteristics of a triode.
- G. Extensions: Further triode circuitry, multi-element vacuum tubes, high-fidelity amplifiers, transistor amplifiers.
- H. Mathematical correlations: mathematical definitions of triode parameters, use of families of curves. Design of amplifier circuits and frequency response.
- I. Radio: modulation, transmission, and reception. Teacher demonstrations: use of cathode-ray oscilloscope to show modulation and percentage modulation. Show headset and speaker.
- J. Student projects: assembling power supply, amplifier, and oscillator already constructed into a small AM transmitter. This may be used with an amateur receiver with a beat-frequency oscillator as a

CW transmitter, or a triode detector may be built and used as a receiver Construction of a working model of a loudspeaker.

- K. *Extensions: Further work on receivers. Construction of a more complicated receiver Construction of a model-control receiver and transmitter Construction of a "ham" transmitter and receiver.*

The preceding unit dealt with a topic which would be taught in a regular physics class, as well as the special class. Often, however, topics are considered in a class of gifted students which are not paralleled in the regular class. Such a topic might be plant communities. An outline of this topic, as it might be taught in a biology class for the gifted student, is given below:

PLANT COMMUNITIES

I. Nature of a Community

- A. Definition
- B. Relationship Among Organisms in a Community
 - 1. Competition
 - 2. Stratification
 - 3. Dependence

II. Analysis of Vegetation in a Community—Quantitative Methods

- A. Sampling
- B. Making quadrats
- C. Transects

III. Factors Which Control the Community

- A. Temperature
- B. Radiant Energy
- C. Light
- D. Climatic Factors
 - 1. Air
 - 2. Gases in soil
 - 3. Water in atmosphere
 - 4. Wind
- E. Physiographic Factors
 - 1. Soil development
 - 2. Soil variations
 - 3. Soil profiles
 - 4. Soil structure
 - 5. Soil content
 - 6. Soil water
 - 7. Topography
- F. Biological Factors
 - 1. Plants as factors
 - a. Symbiotes
 - b. Epiphytes
 - 2. Animals as factors
 - a. Soil animals
 - b. Larger animals
 - c. Man

search methods are a necessity. A greater degree of independent activity and creative endeavors is desired in order to allow the student to express his individual proclivities. These, together with field activities, might well be used almost in place of all other methods.

A possibility also exists in the initiation of seminar or tutorial courses. In these classes, students could present their papers to the class and criticize the work of other students. Papers possibly might also be prepared for publication in these classes. Students would gain experience in presenting their work to a group.

Financial Support

A critical need at the present, which is certain to become more crucial in the future, is the provision of adequate, all-expense scholarships for gifted children whose families are not able to afford the expense of a college education. One of the most tragic abuses of intellectual potential is the neglect of the gifted child who is not able to obtain an education for these reasons. This support may come from industries, many of which, including Westinghouse, DuPont, and General Motors, have already established such programs.

Future Research

The necessity exists for research programs, aimed particularly at determining what methods are most effective in developing specific objectives. Studies are necessary, for example, to determine the most effective means of curriculum enrichment for the gifted child in an average section. Probably the problems of the gifted child in an average group, or even of the especially gifted child in a high-level group, will not be solved in the immediate future in terms of special sections or the special science high school.

Research should also be directed at the contributions of the various methods used in the special section situation and particularly directed at the effectiveness of the various project methods in developing the intellectual skills necessary for a scientist.

SUMMARY

The proper education of the gifted student in science is now of crucial importance. Proposals have been made for the education of the gifted student in the normal classroom by including reading programs, special laboratory and project programs, and science fairs and congresses,

as well as special assignments related to the regular class program. Further suggestions have been made concerning the procedures involved in setting up a special science program for the gifted student, where this is practical. Enrichment sections were discussed, as were special subject classes. Examples were given of types of laboratory activities and types of unit planning which are suitable for these classes. The future of science education, if it is to be effective, requires better trained teachers, curriculum revisions, improved methodology, and the establishment of special schools.

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CHAPTER SEVEN

Creative Writing

RUTH STRANG

For the intellectually gifted, creative writing is a most appropriate avenue of expression. Gifted children are often identified by their superior language ability: they usually begin to talk earlier than does the average child; they rapidly acquire a larger and more precise vocabulary and use more complex sentences; they often teach themselves to read before they enter the first grade. The casual speech of little children often has a rhythmic cadence, a choice of the right word placed perfectly. When written by parent or nursery school teacher, it has a poetic quality. Underlying this language development is a special sensitivity of the nervous system, described by the French psychologist Piaget, that would seem to be basic to creativity in any field.

Realization of this potential creativity requires favorable conditions: the infant needs to develop a sense of trust, the child needs freedom to explore and experiment and also encouragement for his originality. Conversely, the natural creative impulse of a gifted child may be blocked by a barren environment, by lack

of satisfying personal relations, or by emotional conflicts that deflect his efforts from constructive activities.

The gifted child whose creative writing ability is developed through encouragement, practice, and skillful instruction has an ever-present source of personal happiness. Many authors mention the happiness that writing brings—the kind of happiness that stems from self-realization—from functioning at the top of one's powers.

Creative writing makes an immeasurable contribution to society. How many people have gained from great literature a better understanding of themselves, their cultural heritage, the modern world, and the meaning of life! Other kinds of writing may also make important contributions by their truth, persuasiveness, and clarity.

In an age of science and a world of tensions there is special need for literature which interprets man to man and to himself. Arnold Toynbee has said that while the race for atomic weapons is neck to neck, the "minds and hearts of people are still poles apart."¹ Through creative writing in our day and age, nations can become more understanding of one another and consequently less afraid of and less hostile to one another.

In a technological, mechanical, industrial world, the recognition of human qualities of fortitude, courage, loving kindness, which can be conveyed by literature, is essential to a well-balanced civilization. Creative writing makes its appeal to the individual, and as a little boy said when he had put together a picture puzzle with a map of the world on one side and a portrait of a man on the other side: "When I got the man right, the world was right." Society is the richer for the sum total of creative products.

UNDERLYING CREATIVITY

The Nature of Creativity

Creativity does not develop in a vacuum. The potentially creative person needs encouragement, opportunities for expression, and sound instruction; he must derive satisfaction from the creative process and product. Creativity develops as the person responds selectively to his environment. His initially simple perception tends to be developed into increasingly complex concepts and patterns of expression.

Certain accepted components of creativity are common to art, creative writing, science, and other fields. Parents and teachers must be alert to manifestations of creativity in children so that they reinforce instead of ignoring or stifling spontaneous creative expression. In all probability much

¹ Arnold Toynbee, "A Study of History—How the Books Took Shape . . . What the Books Are For," *Wisdom*, Vol. 3, September 1958, p. 9.

creative potential has never reached fruition because it was not identified and fostered.

Components of Creativity

Briefly stated, some common components of creativity are these:

1. Sensitivity to the world of nature and the world of man and to the problems inherent in these worlds. This sensitivity is the spring of creative writing.

2. Keen perception of significant details in the environment. A poem or a short story usually stems from an emotionally perceived experience such as the song of a solitary bird at twilight.

3. Ability to see relations between perceptions and ideas, to combine and arrange them into original and coherent patterns. The writer relates the plaintive song of the bird to the general sadness and sorrow of human life.

4. Ability to see and express the uncommon. Creative writing is identified by its unique, vivid expression.

5. Fluency of ideas. When the writer is in the inspiration stage, apt associations spontaneously occur to him.

6. Acceptance of discipline necessary to master the techniques by means of which ideas may be expressed. Revising the first draft is hard, scholarly work.

7. Flexibility in modifying an accepted idea or an established pattern. Something original is added by the writer who is truly creative.

8. Wholehearted attention and concentration on the task. Children engaged in creative writing are absorbed in the process.

9. Objectivity and judgment in appraising one's products. Writers realize that continuous appraisal is necessary to improve their product.

10. Satisfaction in the creative process. Many writers have found their highest happiness in the process itself.

11. General intelligence is also a factor in creativity. However, intelligence alone does not explain why some people are more creative than others. Children who score very high on intelligence tests may not engage in creative writing because they lack motivation, purpose, persistence, self-discipline, self-confidence, or other necessary temperamental qualities, or because they have had no opportunity or encouragement.

Stages in the Creative Process

All creative processes have much in common although each has its unique features. Painting and sculpture employ the most flexible of the art media. The writer's medium of communication is words whose limits of

meanings must be respected. Similarly, the composer deals with notes and also with the possibilities and limitations of the instruments which he has in mind for his compositions. However, several stages, common to all, have been described by Ghiselin and others:

1. A stage of preparation in which the basic impressions and ideas for the painting, story, song—are gathered.
2. A stage of reflection—of *mulling over* the initial idea.
3. An inspiration as to how the idea may be developed into a poem or a story.
4. The stage of producing the first draft.
5. A stage involving judgment, evaluation, appraisal, or verification.

Conditions Conducive to Creativity

The times have something to do with the flowering of creativity. Certain periods of history seem to have provided conditions favorable to the production of great music, art, or literature. Today, many children and young people are being conditioned to ways of thinking and acting that are inimical to creative work. The mass media of communication emphasize the easy way of life: "take it easy," "pleasure up," "relax," "enjoy yourself"; creative writing requires effort. Too often security and conformity are accepted as goals; creativity requires that one dare to be different.

Some home atmospheres seem more conducive to creativity than others. Of five categories of home atmosphere—actively hostile, passive, neglectful, possessive, and democratic—a warm, fairly consistent, democratic atmosphere seems to be the most favorable to creativity. More specifically, a favorable atmosphere is one in which sensitive, understanding adults enjoy growing with their children. They share experiences and give the children opportunities for initiative and self-direction while maintaining reasonable and necessary limits. In such a social atmosphere children feel free to venture upon new experiences.

The school also plays an important role in developing creativity. A teacher may evoke creative responses by providing things for the pupils to look at and do, by giving them first-rate reading matter that is appropriate to their level of maturity and consistent with their interests, and by seeing to it that they have other materials that they need to carry out their ideas. The teacher watches, listens, perceives, and recognizes any expression of creative potentialities. He observes that children have a strong desire to do original things and to put ideas together in new relations. He rewards originality.

Teaching is a performing art; it involves participating with students and stimulating interaction among students. The teacher also confers with individuals. He accepts the child's goal, helps him to clarify his purpose, and

expresses confidence in the child's ability to achieve his goal. He raises questions and encourages the attitude of "Let's find out." Thus he releases the creative energies in the group and influences the group interaction.

However, this does not mean that the teacher views creative work as requiring no effort. Actually it requires intense effort and concentration, even drudgery. As Hughes Mearns says:

Natural and appropriate drudgery, of course, is one of the saving ingredients in healthy life: in its right functioning place it is a thing to welcome and rejoice in, like any other fine restricting rule of a game; if life could be constructed so as to be free from toil and trouble, which fortunately cannot be accomplished, we should then go out of our way to invent some. *Hardship, difficulty, wearying struggle, these are the very meat of the new education when properly understood in the light of the larger purposes of self-discipline and self-mastery.*²

The teacher influences the pupils' creative responses by the way he teaches the subject as well as by his attitude. In some classes attention is focused so exclusively on the mastery of facts that there is little or no opportunity for thinking about them. Science, for example, may be taught merely as a collection of facts and formulas or as an opportunity to see relations among them.

Creativity obviously is suppressed in an environment that schedules every moment of the child's time, requires unnecessary drill, discourages originality, offers no challenging work, and provides no opportunities for exploration, judgment, and self-direction.

Creative Writing as an Expression of Creativity

Creative writing is a means of communicating creativity of many kinds. It may record creative reading and thinking. In reading, the gifted child comprehends more than the literal meaning of the selection; he reads between the lines and beyond the lines. Something in what he has read intrigues him, and he builds upon it. He keeps in mind impressions from many sources. As he thinks about what he has read, he sees similarities and differences in ideas, he relates things that have not previously been related and connects things that have not been connected before. In this sense a student's report on a technical topic on which he has done a great deal of critical reading may have a creative aspect.

A student's personal reaction to books and articles he has read often has a creative quality. When high school students are asked to write about an influence some piece of literature has had on them, they frequently express their thoughts and feelings in an intense, original, unique way. For

² Hughes Mearns, *Creative Power* (New York: Dover Publications, Inc., 1958), p. 209.

example, one ninth-grade boy expressed his changed idea of war after reading Ernie Pyle's *Brave Men*: "After reading this book I learned the truths of war . . . that war was not all glory, or sparkling uniforms, or just one victory after another; that war is not fought by men who enjoy killing and aren't afraid to die! . . . I saw that the men in our Armed Forces were not supermen, but just ordinary people pulled into this terrible maelstrom, like needles pulled to a magnet. I learned there is glory to a victorious army but it comes after many men are killed or wounded."

In writing about the influence of the Bible, a girl of the same age used expressions such as the following: "Although I was brought up in a Christian way of thinking, *the Bible stabilized my thoughts*. . . . The Bible is, in itself, a great teacher. . . . It is truly the universal book."

More commonly, creative writing is thought of as independent of facts—as giving free play to imagination and self-expression, as characterized by fluency in symbols. It is thought of as a fancy-free realm where intellectualized abstraction plays no part.

Actually there is no hard-and-fast dividing line between these two kinds of writing. A summary of investigations may be creative and vivid in its language; a poem usually expresses thought as well as feeling. In writing a description a child selects and arranges detail in a unique way. In summarizing in his own words what he has learned, he gains new insights as he puts together facts and ideas he considers relevant. In an imaginative story or poem he builds to a greater extent with materials supplied by his own imagination. The composition program as a whole should balance practical utilitarian writing and personal subjective expression, such as autobiographies, tall tales and other stories, essays, and poems.

KINDS OF CREATIVE WRITING

Creative writing is difficult to define. Its most distinguishing quality is its uniqueness of thought and expression; nothing just like it has ever been written before. It is exceptional in its insights, imagination, and pattern.

The purpose as well as the product may distinguish creative from utilitarian writing. Sometimes children write to express their innermost thoughts and feelings. Sometimes the stimulus to creative writing is the atmosphere of the group, suggestions from the teacher, poetry, and other literature read aloud to them, or a topic of interest in any field.

Response to Need to Express One's Individuality

This kind of writing is the private poetry that some children and adolescents write in secret. They are reticent about giving it to a teacher;

they fear being thought "queer" or laughed at by their classmates. Hughes Mearns¹ had a "poetry drawer" in which the children, of their own accord, put their unsolicited poems.

Response to a Group Atmosphere

In a certain atmosphere children have a feeling of being free to be themselves and to express their thoughts in response to the stimulation of genuine inquiry. Each child contributes spontaneously to the opportunity to tell how he feels about this first spring day or the first Christmas, or what he should be thankful for on Thanksgiving day. As each child expresses his thought or feeling, the teacher writes it rapidly. Later they choose the best statements and combine and rearrange them to form a story or a poem.

Response to Suggestions Given by Teacher

The following descriptions, written by Nelda Davis on her visits to classes as a fellow of the Fund for the Advancement of Education, illustrate approaches for working with groups in the elementary school:²

The workshop of the first two grades in Colfax School, Pittsburgh, Pennsylvania, is in charge of a teacher with imagination. One day the class interest was beginning to lag. It happened to be St. Patrick's Day. With a great deal of enthusiasm the teacher said, "Let's imagine what would happen if you fell asleep on St. Patrick's Day." One boy said, "We'd miss a lot." The teacher replied, "Oh, come now, be more imaginative than that." Then they really began talking. As one pupil described what he thought would happen, the teacher would tell him to start writing it down. Here are some of the things that they said: "When I fell asleep I found myself in a world all green. It must be St. Patrick's world." "A big shamrock appeared and told me he would show me all I wanted to see." Sentence structure and correctness of expression were given attention in the writing of the final product.

A sixth grade had an IQ range from 100 to 130. One teacher had them for social studies, and another teacher had them in mathematics, spelling, and English. They had just finished writing and illustrating their autobiographies. As a group they had first planned the organization of an autobiography: introduction, early years, school days, hobbies, and the like. They chose parts of their autobiographies to read aloud. Each booklet showed originality in design and content. Here are two of the dedications (Bruce, before he read his, said, "I thought this would be a hint to Daddy.")

¹ Hughes Mearns, *Creative Power*, Chap. 2.

² Reported to the author by Nelda Davis. See also Nelda Davis, "Creative Activities for Gifted Pupils," *School Review*, Vol. 63, February 1955, pp. 85-90.

"This book I dedicate
To the dog I never had
With the cute little face
That would droop when he was bad.

"The big floppy ears,
The short stubby tail,
And with me he'd romp
Over hill and dale.

"He'd do very useful things
When he grew up.
Yes, this book I dedicate
To that cute little pup."

Another dedication:

"Mother helped me to look into the past,
Daddy dug up some pictures real fast.
Miss Peters really inspired me.
This book I dedicate to all three."

This class is now working on tall tales. One boy said that his tall tale explained how the geyser, Old Faithful, began. It seems that a whale was boxed up under ground; it kept spouting water, until it finally forced an opening.

Another boy told a tale about an inchworm that made him two inches tall and took him to the Inchworm Suit Factory to measure him for a suit. He had quite a time explaining to his mother where he had been. When the suit arrived it was for a boy two inches tall.

Response to Poetry

Without any hint of imitating, the poetry read to children creates an atmosphere and casts a spell in which the children's own creative impulses seem to be released. Samples of the best poems of the class may also serve to encourage more creative writing on the part of others. Later in this chapter there is an example of a more formal use of poetry as a springboard for creative writing.

Creative Summaries

A term paper based on bibliographical study is usually not classified as creative writing. And yet such a paper may show a good deal of originality, inventiveness, and ability to see relations and synthesize ideas. Creating a unified structure is akin to the artist's first steps in the conception of a painting. Exploring sources and judging their authenticity and relevance to

the topic are certainly more than mechanical tasks. Taking notes is a continuous process of making judgments and relating additional ideas to the initial structure. Expressing one's ideas effectively is basic to creativity. An imaginative but accurate use of words adds the final creative touch to a term paper. A term paper may be only a series of summaries of separate articles strung together like clothes on a line, or it may be a creative synthesis that has unity, coherence, and emphasis.

Writing About Science

Scientific writing, too, has a creative quality. Creative imagination is needed to see relations and resemblances between facts and to take a step beyond established facts. Not only must the scientist describe clearly and correctly a given scientific process or event; he may also have to use persuasion, deal with complex human relations, and foresee probable consequences. As a background for his writing, the scientist needs the understanding of human beings and the art of living is to be found in great prose and poetry.

Influence on Other Activities

Achievement of creativity in writing may influence performance in other areas of the curriculum. Learning does generalize when activities have common elements or similarities. As has already been pointed out, the components of creativity are common to many fields. The gifted child will be quick to apply the creative writing process to other areas of life.

MOTIVES AND VALUES IN CREATIVE WRITING

The Lonely Leaf²

I saw a lonely leaf
Lying beside a tree.
It seemed to me
The leaf was
Lonely as could be.
I wondered why this should be.
It was a cold, grim day.
Then it occurred to me
That the lonely one
Was really me.

Creative writing enables children to bring their troubles out in the open. By facing their problems and trying to describe them, they are better able to work them out. Some problems cannot be solved. From these, creative writing offers an avenue of escape. As the student gains skill in creative writing and receives recognition for this special competence, the creative activity brings positive satisfaction, which makes unsolved problems more endurable.

Writing is most effective when the writer has an audience in mind. Children too often write their compositions with the teacher in mind; then they may become concerned excessively with conventions and with grammar and spelling. If they were writing for their classmates, a relative, or a distant friend, they would be freer to communicate in an entertaining way. Youngsters often feel that they have nothing worth communicating; they need to feel that their experiences are accepted as of interest to others. For example, a migratory worker's child felt that she had nothing to contribute until the teacher pointed out how many experiences she had had that none of the other children knew anything about: the traveling she had done, the places she had seen, camping out, and so on.

CHARACTERISTICS AND CONTENT OF CREATIVE WRITING

Relation to Stages in Development

Growth in creative writing varies with individual children's age and stage of development. In general, as they progress through elementary school, their compositions become longer, more complex in sentence structure, and more varied in content. Under unfavorable conditions, research has shown that children's writing may become less spontaneous and less varied in expression as they progress through school.

Under stimulating conditions elementary school children write at greater length and with more variety at each succeeding grade level. Paul Witty and William Martin found variations in the characteristics of compositions writ-

² Submitted through the courtesy of Edith M. Cooper, Director of Elementary Education, Rose Tree Union School District, Lima, Pennsylvania.

ten in response to the Encyclopedia Britannica film, *The Hunter in the Forest*:

In the first grade, many children made egocentric responses, and also showed a tendency to label objects in the picture. In the second-grade compositions, these children included more detail in the questions they raised. In the third grade, they still wrote more detailed and objective descriptions of the picture. Many of them told how they felt about the picture. A few wrote poems that showed their pleasure in the sound and rhythm of language and in imaginative phrases and metaphors. In the fourth grade, the compositions showed more awareness of the reader and a greater desire to communicate. They were somewhat longer, more skillfully written, more detailed, and more imaginative than those of the third-grade pupils. At this level also, simple evaluations began to appear. In the fifth and sixth grades, the pupils tended to express themselves more clearly, imaginatively, uniquely, and creatively. They used more metaphors, and their language was fresher and more original. Some of their compositions were five or six pages long. They were more aware of the symbolism of the film, and their papers contained more interpretation of it.

Every grade yielded some highly imaginative and mature compositions. An estimated 60 per cent of these two thousand children wrote effective prose or poetry; 10 per cent were judged to be gifted in the use of language. Witty and Martin offer a number of quotations exemplifying uniqueness, originality, and imagination, such as the following:

The hunter steps silently from his door
Out into the woodland.
The trees grow tall, the grass grows high
On the forest floor.
The time is spring.
The fawns have come,
And soon a shot will ring
Only to make them lie silently on the forest floor.*

As well as helping to identify pupils potentially gifted in writing, this film stimulated creative expression in all the pupils. Even the less able were motivated to write creatively.

It is wise to begin creative writing early before children become self-conscious and inhibited in expressing themselves freely. Mothers have written of some of the spontaneous intimate conversations of their pre-school children. These sometimes have a perfection of expression and an originality of thought, such as the following.

* Paul Witty and William Martin, "An Analysis of Children's Compositions Written in Response to a Film," *Elementary English*, Vol. 34, March 1957, p. 162.

Do you know what the stars are, Mother?
They're the lights God puts out
So I won't be afraid
Of the dark.⁷

Fresh Insights

The essential characteristic of creative writing is its unique quality: *no one has ever expressed that thought or feeling in such a way before.* Hughes Mearns recognizes that this quality is sometimes found in rubbish heaps of ordinary writing.⁸ It is often found in children's clipped speech when they are excited about the experience they are having. But the teacher is all too rare who recognizes these gems, digs them out, and makes them shine before the child himself and his classmates. Only by giving the highest recognition to these truly superior products will the level of creative writing in a group be raised. The children need to see for themselves the heights which they can reach; they should not be content to remain at lower levels. Giving recognition to the most creative product need not discourage other children who have not yet attained this authenticity of unique expression. They, too, have other accomplishments worthy of recognition and approval.

Perfecting the Product

The teacher can be most helpful by making personal comments on each paper. These comments must be concrete. They should call attention to the unusual phrase, the uniquely appropriate words, the creative part of the composition. They should be concerned with thought as well as with form. One college professor of English wrote on a freshman's first composition, "You write well; later we'll teach you to think."

Creative writing should not be confused with careless writing. Any writer needs a basic sense of language structure. There is a place for the teaching of spelling, grammar, and other technical aspects of writing, but drill should be kept separate from the creative process. Misplaced emphasis on mechanics may inhibit children's *fresh, spontaneous, vivid expression*. When the need for drill is recognized in various kinds of writing, the teacher gives the necessary instruction and practice, individually or as a unit for the entire class.

Effective writing of any kind has these common qualities: clarity; precise and appropriate diction; correspondence of thought and structure, of feeling and intention; varied means and modes of expression, which increase interest and thus contribute to communication; and skillful use of

⁷ Hughes Mearns, *Creative Power*, p. 77.

⁸ *Ibid.*, pp. 23-24, 31-38.

rhythm and sound to accentuate meaning. One perfects these elements of style by reading much good English prose and by constant practice.

Understanding of the structure of language deepens the individual's enjoyment of language. Gifted adolescents are usually thrilled by the semantic analysis of words. One ninth-grade girl wrote enthusiastically about an article by Hayakawa entitled, "How Words Change Our Lives." She said, "Although I am not very familiar with the author, I was very interested in his approach to our everyday language . . . Words can often express deep feelings such as love, sorrow, or perhaps even fear. . . . To take advantage of a symbol or picture, to relate ideas to one another is one way in which to bring the people of the world closer together. . . . The violence which disrupts the peace of nations can be avoided if we all can come to a simple, basic understanding."

CREATIVE WRITING PROCESSES

Individual Differences

According to their own accounts, gifted writers use various creative processes.⁹ Some capture an emotional moment, recollect and reconstruct it in tranquility, and then translate it into words. Others, starting with some experience that they feel deeply, go to work at once with intense concentration to put it into form. Some say they have the entire story or essay in mind before they begin to write; then they merely copy it on paper. Others describe the creative act as occurring during the process of applying pencil to paper. Byron claimed that if he did not get the desired result at the first attempt, he never got it at all. Others spend months in perfecting a single poem. A few writers, like Stevenson, admit that they sedulously imitated the techniques of a master, while others do not mention having labored to master the tools of the trade. In describing his method of writing *A Study of History*, Arnold Toynbee said that the germ of the idea grew from the love of history that his mother gave him and was fostered by his education in Greek and Latin. After he had made one false start in planning the book, the ideas for the thirteen main headings came to him spontaneously as he "spent the day looking out of the railway carriage window."¹⁰

A common sequence may well be followed by students in creative writing classes: an emotion experienced giving the germ of an idea; an attempt to recollect and develop the initial idea; an effort to put it on paper—to shape it into communicable form. This spontaneous first draft—often crude

and bungling—is worked over by cutting, enlarging, unifying, and perfecting the wording and thoughts.

Obviously, the writer must somehow learn to use the tools and techniques of his craft. After he has learned to find ideas for his creative work in the life around him, he must acquire facility in expressing his ideas. To this end, he studies the work of masters who preceded him. He observes how they used certain words or constructions to produce the effects they had in mind.

Accent on Originality

It is most important, however, for teachers to be aware of and appreciate children's individuality. There is danger, as Hughes Mearns points out,¹¹ of neglecting the individual quality, the unusual line, the poem that does not conform to a traditional pattern. Such writing should be appreciated so that the child learns to value the original far above the conventional. Later he can learn how to make words express and communicate more accurately his thoughts and feelings.

Criteria of Creativity

Criteria of judging creativity in writing would include, first and most important, its effect on the reader—what is really communicated. Next in importance is its unique quality—an original thought or a way of expressing it. Other criteria are genuineness of feeling and sensitivity to the value of particular words, phrases, and longer units in conveying this feeling. Design, rhythm, and correct and appropriate use of language have their place but only as they facilitate "the perfect picturing of thought and feeling."¹² To detect the essential creative qualities in the writings of children and young people is a teacher's most difficult task; it is really the task of a creative writer.

STIMULI TO CREATIVE WRITING

Stimuli to creative writing include excursions, wide reading, and association with different kinds of people under different circumstances. As already described, stimuli may also be presented through films and film strips.

¹¹ Hughes Mearns, *Creative Power*, pp. 36-37.

¹² *Ibid.*, p. 24.

Things to Look at and Listen to

Learning to look at one's surroundings attentively is essential to creative expression. Accordingly, teachers recommend that superior students look at some object—a tree, a spring landscape, a picture, an empty box—"until they see something not seen before."¹² Then they put their impressions on paper.

Learning to listen utilizes another avenue of sense impression. One teacher repeatedly played a selection from an opera while the students filled the chalk board with words that the music suggested to them. One boy said that was the first time that words became exciting to him.

Books

Books may be a springboard to creative writing, as Mabel F. Rice so delightfully illustrates.¹⁴ For example, one teacher evoked some exceptional poetry from upper-grade pupils in response to the suggestion that they write answers to the question Nancy Hanks asks in Rosemary Carr Benét's poem, "Abraham Lincoln."

Gifted children have a capacity to understand deeper levels of interpretation. For example, as David Russell points out,¹⁵ a gifted child may be capable of seeing *Tom Sawyer* as more than a story of a boy's adventure or an account of life on the Mississippi; he may perceive in it a more universal theme—the conflict between the respectable citizen, as represented by Aunt Polly, and the ne'er-do-well, as represented by Huck Finn and his father. As children learn to reach down to these deeper levels of interpretation in their reading, they become aware that their own best writing can have a similar basis.

Acquainting pupils with the best in reading helps to raise their standards in writing. They should have access to a wealth of reading material—not only books, but files of clippings, and informative pamphlets and leaflets from government, business, and industry. Even books of poor quality may have value if they help pupils to learn to appraise the quality of reading matter.

Interesting People

The teacher should make use of all available resources in the school

¹² Floyd Rinker, "Stimulating Creative Expression," *NEA Journal*, Vol. 42, December 1953, p. 551.

¹⁴ Mabel Rice, "Good Books: A Springboard to Creative Expression" *The Packet*, Vol. 13, Winter 1958-59, pp. 3-15.

¹⁵ David H. Russell, "Reading for Effective Personal Living," *Reading for Effective Living* (Conference Proceedings, International Reading Association), Vol. 3 (1958), p. 16.

and community. Persons with varied backgrounds and experiences who are willing to share their knowledge and insights may stimulate the children to do likewise; they may help the pupils to see more clearly the value of their own experience and so gain increased incentive to communicate it.

Suggested Topics

Many other stimuli to creative writing are suggested by Robert C. Wilson.¹⁶ Some of the suggested topics stimulate sensitivity to problems: "What would you do if you were on a picnic and had brought steak and potatoes to cook, but had forgotten the frying pan?" To find solutions to everyday problems that are feasible, socially acceptable, and personally satisfying is a practical kind of practice in creative expression. A more philosophical kind of problem that Wilson suggested as a stimulus to creativity was: "What would happen if—we knew when we would die?"

Other topics encourage ideational fluency: "If you were exposed to extreme cold, what things would you think of that might bring you comfort?" "If you had an evening to spend alone at home, list all the ways . . . that you might entertain yourself." One can also stimulate fluency of ideas by allowing pupils ten or fifteen minutes each day to write whatever they wish.

Invitation to Introspection

Learning to express the way one's mind works constitutes much of the content in a unique college composition course.¹⁷ Students are asked, for example, to describe just what they did when they read the letters, words, and sentences of witticisms such as: "You can always tell a Harvard man, but you can't tell him much." It is stimulating to mature students to reflect on their own feelings about creating something, to describe the conditions under which they work best, and to outline their ways of getting and developing their good ideas. Students often need to become more aware of their purposes and methods.

Possibility of Publication

Seeing their stories or poems in print may be an incentive to some pupils to do more creative writing. A classroom magazine may furnish such

¹⁶ Robert Wilson, "Creativity," *Education for the Gifted*, Fifty-Seventh Yearbook of the National Society for the Study of Education, Part II, N. B. Henry, ed. (Chicago: University of Chicago Press, 1958), pp. 108-126.

¹⁷ James Broderick, "A Study of the Freshman Composition Course at Amherst: Action, Order, and Language," *Harvard Educational Review*, Vol. 28, Winter 1958, pp. 45-57.

incentive. Editor, art editor, make-up editor, reporter, "dittoman," and typists are positions that offer opportunities to employ a wide range of ability in a heterogeneous class. Manuscripts are solicited from members of the class. The magazine may be read by other classes as well as by the class that produces it. However, writing for school publication may not furnish an incentive for writing when a high level of creativity has already been achieved. In fact, it might cause some gifted children to write the kind of material they know will be accepted rather than to express their individuality.

Receptive Attitude of Teacher

At every age creative writing is stimulated by the teacher who shows appreciation of and encourages truly creative expression. Creativity in a scientific type of writing is fostered by the teacher who is open-minded rather than dogmatic—who emphasizes the growing edge of scientific knowledge. In his examinations even, he will encourage originality by calling for the use of facts in new relations, rather than for mere memorization of facts. This is not to discount the importance of knowledge but to caution against getting bogged down in a morass of unrelated data. The way facts are learned determines in large part the way they will be used in writing.

Possibly Unproductive Procedures

Among the procedures that have not been confirmed by research are the preplanning of stories, the study of vocabulary word lists, and formal drill on using colorful or different words. Correcting errors in grammar or spelling while writing the first draft has been found to interfere with creative self-expression.

DETERRENTS TO CREATIVE WRITING

Conditions that may block creativity should also be recognized. Television, radio, and other mass media of communication "can become deadly instruments for the prevention of thought. They can keep attention on the trivial and the transient. . . . They can destroy the leisure and peace and freedom from distraction out of which the exceptional mind is born."¹⁸ Television often discourages youngsters from using their imagination or thinking creatively; the story is all spelled out for them. Moreover, television stories seem more exciting to them than any they can write.

¹⁸ Joy Elmer Morgan, "Alone in Its Field," *National Parent-Teacher*, Vol. 51, November 1956, p. 25.

Thus they tend to accept and imitate the television patterns, instead of creating their own stories and experimenting with characters they have imagined.

Emotional factors may block creativity.¹⁹ Inner conflicts may prevent an individual from putting forth the effort and intense concentration creativity requires.

THE TEACHING PROCESS

The teacher who helps children and young people to write better is somewhat like a gardener. He plants the seed; he provides conditions favorable to growth; he pulls out the weeds—gently; he waters his plants when necessary; he delights in their fruition. He offers opportunities to all, but reserves his highest, most intense appreciation for the truly creative products. He also makes clear the wide gap between the products we have loosely called "creative" and the work of the great creative writers of all time.

Identifying Verbal Ability

The seed or creative impulse is within the child; it needs only to be evoked and recognized. Through daily observation the teacher will recognize characteristics, such as those suggested earlier in the chapter, which may indicate potential creativity. As a teacher listens to children's conversation, he may identify unusual language ability of which the child himself is unaware. Poems children shyly slip into the poetry drawer; unusual responses to a film without words or to an individual or group experience; a personal reaction to a book or article; even a report on a topic may contain unusual ideas and exceptionally appropriate choice of words and phrases. A more formal but less effective means of initial identification of talent is to study the pupils' responses to several different kinds of writing assignments. These formal means of identifying talent should be used as a last resort. It is better to provide conditions conducive to creativity and observe the children's responses.

Providing Firsthand Experiences

Since creative writing stems from first-hand experience, the teacher will provide opportunities for the child to observe, explore, and participate in the world about him. A knowledge of the interests and abilities of the

¹⁹ A. H. Maslow, "Emotional Blocks to Creativity," *The Humanist*, Spring 1958, pp. 325-358.

individual pupil is a prerequisite for selecting the materials and methods of instruction that the individual child needs.

To explore systematically the pupil's background—his patterns of leisure activities, social relations, hobbies, play preferences, reading, movie attendance, and television and radio listening—to assess his familiarity with places of local interest and modes of travel, an inventory such as the *Northwestern University Interest Inventory* has been used. By using such a checklist, the teacher not only gains information about the pupil's background of experience, but also may direct the pupil's attention to new fields of interest.

But a checklist is not necessary. The teacher may simply ask pupils about their interests and activities, or, better still, listen while they talk about things of real concern to them. In this way he will learn much about the variety and adequacy of their previous experiences.

The gifted child will be curious about the things he hears and sees. He will become personally involved in problems they present. The teacher's role is to understand the child's excitement and give him time to explore in his own way. These moments of emotional involvement are the genesis of the child's most effective writing.

Equally important are moments of solitude. Today's gifted child is too often overscheduled; he has no time, as the poet put it, to "stand and stare," no time to put his fleeting thoughts into words. He needs time to learn to look and listen, to reflect, and to describe what he sees and hears. Ideas come gradually, and not usually for the asking. An environment in which solitude is possible allows the creative spirit to try its wings; it encourages the gifted child to express his inner thoughts and feelings, it brings his individuality to the surface.

Accepting and Approving

As already suggested, the teacher's attitude toward the child's creative effort is of the utmost importance. The teacher should not only accept, but welcome and encourage independent thought, and be receptive to new ideas. He fosters creative writing by listening for and spotlighting the child's new ideas; he conveys some of his own excitement over the creative product. His approval is genuine and discriminating and varies in intensity with the quality of the poem or story. When a pupil has produced something novel, he should experience the satisfaction and joy that are the due reward of creative work. Some of this satisfaction arises as others approve and encourage his progress. Creative endeavor is easily restricted by indifference, harsh criticism, or ridicule. Fear of criticism often inhibits a sensitive individual. The struggle to use new words often results in errors. A

degree of tolerance with respect to mechanical errors is more conducive to creativity than an inflexible demand for perfection.

Criticism at the Psychological Moment

A good product can be made better. There is a place for kindly, constructive criticism: when the child is dissatisfied with his product and recognizes his lack of technique necessary to communicate his idea. At the same time, he may need suggestions for possible avenues of expression that he might not think of by himself. The responses the child receives from others should lead him to make increasingly thorough, critical appraisals of his own products.

Timing and Scheduling

Timing, too, is important. "Strike while the iron is hot" applies to creative writing. Inspiration quickly fades away. If a child frequently finds that he *must postpone the expression of his creative impulse until arrangements can be made*, he may get the habit of ignoring his creative insights. Too much ado about preparation may suppress spontaneity. The flexibility of the arrangements in truly progressive schools is one reason why they are more conducive to satisfying creative expression than are rigidly scheduled traditional schools.

Maintaining Order

Discipline in the sense of order is also essential to creativity. Gifted children often complain that disorder in the classroom interferes with their learning and success. They recognize different kinds of order. They know the difference between rigid, authoritarian control that inhibits creative impulse, and reasonable orderliness, maintained with the consent of the governed, that insures the necessary quiet and freedom from distraction in which spontaneity and inspiration may flourish.

Offering Opportunities for Sharing

Since writing is, in part, a response to the need or desire to share experience, each pupil should have opportunities to hear his work read and discussed by the whole class. In one school, Friday afternoon is scheduled as a time when pupils may share with each other their stories, plays, and poems. The children call this period "The Happy Hour." They listen to well-known stories that they like and to poems and stories they have writ-

ten. They also sing, and play on instruments which they themselves have made.²⁰

When a story or report is presented to an audience, it should receive courteous treatment. The writer's attention should be focused on the important question of whether he has succeeded in communicating his ideas or feelings, rather than on the errors he has made. A positive comment is often more effective than criticism in stimulating a child to greater effort.

Facilitating Initial Efforts

Every individual has some thoughts or feelings worthy of expression. Children and adolescents often astonish us with their insights. When they write about their personal life rather than about international relations and other subjects beyond their comprehension, their compositions are more likely to have the depth and sincerity of literature. When a child finds it hard to get started in writing, it may help him if he just writes down whatever thoughts he has. The mere act of writing sometimes sets his thoughts in motion and he can go on from there.

This is not to advocate neglect of preliminary thinking. Thinking before writing is generally considered necessary. However, preliminary thinking should generally not take the form of an outline, which some pupils regard as an end in itself rather than a guide. A few simple notes on the main points are often all that is necessary.

For many children, thoughts come faster than they can be captured in writing; the mind works faster than the fingers. Difficulty with spelling often blocks the flow of thought. The young child may be helped by being permitted to dictate part of his story. Katharine Koch gives an example of the effect of overemphasis on neatness, spelling, and penmanship. One child's paper was very neat, very well written, very correct as to spelling:²¹

"I have a little dog. My dog is black and white. He comes when I call. He is a good dog. I like my dog. He chases squirrels."

Another child of the same age turned in a hurriedly written paper full of words scratched out and sentences run together:

What a rascal my little Dog Scamp is! His favorite sport is chasing a big fat squirrel that lives in an oak tree how that squirrel loves to torment scamp. . . .

The teacher accepted this paper as a first draft and said, "I can almost see your dog *Scamp*. You have used colorful words, too. . . . What rule

²⁰ Irene Grubnik, "Creative Expression in Halloran School," *Elementary English*, Vol. 34, March 1957, pp. 149-152.

²¹ Katharine Koch, "Kindling the Imagination," *The Packet*, Vol. 11, Fall 1956, p. 11.

have you learned about writing the name of a pet? Where did you forget this rule? This is the way to spell *torment*, and *flirt* uses *ir* as in *girl*. Now proofread your paragraph to see where you need capitals and periods for sentences. Then, how about making a neat copy to share with the class?"²²

Another teacher used Elizabeth Coatsworth's poem, "Swift Things Are Beautiful," to stimulate imagination and vividness of expression. In response to her question, "What are other swift things that you think are beautiful?" the children gave the following responses:

a humming bird darting from flower to flower
squirrels chasing thru treetops
a hawk swooping downward.²³

And some slow things:

apple blossoms drifting from a tree
butterflies hovering over flowers
a red sun sinking behind the horizon
a yellow caterpillar crawling.²⁴

Katharine Koch also described how the teacher noticed the children's interest in Peggy's statement, "Time when you're kept after school is the slowest thing." She asked them to suggest appropriate words to describe this slowness. They suggested such words as *snail-like*, *poky*, *low gear*, *creeping*, *drag*, *lag*, *crawl*. Then she said, "Now look at the clock, imagine you are staying after school and write a line or two about the way time drags." After they had suggested a number of lines, the teacher helped them to arrange the lines into a poem:

The sluggish ticking of the clock
Dull, dragging minutes,
Slow, dunce-capped minutes,
Minutes creeping tick by tick—
That's time after school.²⁵

Topics that specially interested these fifth-grade children were the weather, spring, stars and night, birds, water, wishes. About autumn one child wrote:

King Midas has
A touch upon the land.
A golden touch,
A touch on every hand.²⁶

²² *Ibid.*, pp. 11-12.

²³ *Ibid.*, p. 14.

²⁴ *Ibid.*, p. 14.

²⁵ *Ibid.*, p. 14.

²⁶ *Ibid.*, p. 15.

Preparing Exercises to Improve Expression

Some teachers have prepared exercises to improve the children's writing in some respect: for example, to make barren sentences more descriptive or to change vague, general words into picture-forming words. For example, in a description of a series of revolutions in Mexico, William Wharton replaced the word *series* by the picture-forming words—"A fire-cracker string of revolutions." Other types of writing words to order are of doubtful value; they may give students the idea that words are ends in themselves rather than means of expressing ideas.

Another type of exercise asks the pupil to pick out the verb in each of a number of sentences and to tell how it changes the picture:

The leaves fluttered to the ground.
The leaves sailed across the field
The leaves rustled in the breeze.
The leaves whirled in circles
The leaves drifted downward
The leaves piled in heaps.²⁷

Creative Writing Classes in a High School

In the ninth and the eleventh grades, Zelma May Oole, Shorewood High School, Milwaukee, Wisconsin, has taught creative writing classes designed to serve the ends of both guidance and literary expression—to help students understand themselves and others, and to release emotional tension by writing about their personal experiences. These goals are achieved by means of individual conferences, written comments on the students' papers, and class discussion of manuscripts that the students volunteer to read aloud. The general atmosphere of the class is one of freedom with responsibility, acceptance of the individual, and concern for his personal development as well as for the improvement of his writing. In the individual conferences, the teacher helps the student determine how many and what kind of manuscripts he will write, choose subjects close to his personal experiences, and recognize and solve problems of organization, style, and technical correctness.

The comments that the teacher writes on the manuscripts are an important part of the teaching procedure. In the case of students who do not choose to come for conferences, these written comments are the chief means of individualizing instruction. The comments raise questions, stimulate thinking, require students to make choices and decisions.

In the class discussion, those who are ready to read their manuscripts or to let someone else read them profit from the opinions of their peers.

²⁷ *Ibid.*, p. 18.

Sometimes the comments enhance the individual's self-esteem; sometimes they give him suggestions for better organization, more appropriate use of words, more effective ways of communicating his thoughts to an audience. Personality changes may also take place. For example, one boy had played the part of the class clown until he read the class a serious story and poem. These changed his classmates' attitude toward him; he began to see himself as a worthier, more purposeful person.

THE CREATIVE WRITING CURRICULUM

In addition to the general suggestions for fostering creative writing, many approaches, methods, exercises, and devices have been used by teachers on various grade levels. All these activities constitute the creative writing curriculum, which should be continuous throughout the grades rather than being set off in blocks or units. The general principles and procedures are similar on all grade levels though stimuli, resources, and content will be different. Thus children gifted in creative writing will be discovered and children already identified as gifted will be given, through individualized instruction, opportunities to go as far and as fast as possible.

In the primary grades, the teacher may start with some natural interest or curiosity of childhood—the wind, the first days of spring, a stray kitten—and encourage the pupils as a group to express their thoughts and feelings about it. The teacher accepts all contributions, writes some of them on the board, helps the children combine the separate phrases and sentences into a story or poem. This group experience in dictation has a number of values: it makes children aware of sentence structure, stimulates them to further expression, is useful as beginning reading material. The satisfaction which they get from seeing their ideas take on visible form often encourages them to try their wings further.

Whenever time permits, the teacher provides for individual dictation. Research has shown that such dictation results in a greater variety and number of words and elaboration of ideas. If the child is willing, the teacher will read his dictated story or poem to the class and will sometimes point out the original and imaginative ideas and phrases in it.

This experience in making group and individual oral reports and observations contributes to their writing in the intermediate grades. As soon as gifted children gain more facility in handwriting, they will begin to write independently. The teacher accepts each production as a first draft. With the child's permission he may read some of them aloud, post worthy efforts on the bulletin board, or publish them in the class or school paper. The children realize that if a composition is to receive this kind of recognition, it must be in correct form as well as creative; they work hard on revision.

In junior and senior high school, there is less class production and more individual creative writing, guided by the teacher. Group conversation about a first-hand experience, by lifting it to a symbolic level, can result in insight and new ideas and thus lead to more original and varied writing than undigested first-hand experience. Older students receive more and more opportunity to appraise one another's writing.

In all grades, elementary and secondary, appreciation of literature goes hand in hand with writing. As students study literature appropriate to their level of maturity, they become aware of the development of character and the ways in which writers use words to convey emotions and ideas.

Concern with creative writing has been shown by a number of school systems. To help teachers develop creativity in children's writing, these schools have published some excellent practical bulletins.²⁸

PROJECTION INTO THE FUTURE

In the past, several conferences have been held on creativity in general. Important research on the nature of creative thinking at the University of Southern California has been reported by J. P. Guilford.²⁹ But recent investigations on creative writing are meager. Among the most directly relevant are the studies by Neal R. Edmund of the relationship between prior experiences and the quality of creative writing done by fifth- and by seventh-grade pupils. These studies were reported in *Elementary English* for April, 1958, and in the *Journal of Educational Research* for March, 1958. In a review of research in this field, Alvina T. Burrows arrived at one dominant conclusion, namely, that the most important condition for growth in creative writing is "the stimulus and support of an adult who cares about each child and his success in putting his ideas into written form."³⁰

In place of the trivial comparisons often made in the control-group type of experiments, accurate descriptions of teachers in action, such as in

²⁸ Houston Independent School District, *Telling and Writing About Stories and Poems*, Department of Curriculum and Instruction (Houston: Public Schools, 1957); Los Angeles County, *Guiding Growth in Written Expression* (Los Angeles: Board of Education, 1956); New York City Schools, *Developing Children's Power of Self-Expression* (Brooklyn: Board of Education, 1952-1953); Portland Public Schools, *Good Reasons for Writing* (Portland, Oregon: Board of Education, 1957); Wilmington Public Schools, *We Write What We Think* (Wilmington: Board of Education, 1956).

²⁹ J. P. Guilford, "Creativity," *American Psychologist*, Vol. 5, September 1950, pp. 444-445, and "The Nature of Creative Thinking," *Research Bulletin, Eastern Arts Association*, Vol. 5, March 1954, pp. 5-9.

³⁰ Alvina T. Burrows, *Teaching Composition: What Research Says to the Teacher*, p. 3.

Hughes Mearns' inspiring book,³¹ would be more rewarding. Mearns conveys his warmth of feeling for the children, his casual approaches to evoking their creative writing, and his methods of stimulating them to write with increasing sincerity, spontaneity, and originality. Also helpful would be detailed descriptions by other teachers of gifted children who have responded to the personality of the teacher, the classroom atmosphere, the stimuli provided by the teacher and by classmates. Such accounts would give insight into the interaction in a classroom that is conducive to creative writing.

SUMMARY

Creativity in all fields has much in common. According to many writers, there is a creative spark in every child. It is often snuffed out by indifference, poorly-timed criticism, and the practice of rewarding mediocrity. It is fostered by an atmosphere of acceptance and approval, by recognition and appreciation of products of superior quality, and by assistance in fanning the spark into a clear, brighter flame.

Creative writing is one expression of individuality. It is recognized by its unique quality. It is judged by its effect on the reader. It is enhanced by qualities of sincerity and genuineness of feeling accurately communicated. Creative writing involves effort and concentration. In its finished form it is characterized by correct and appropriate use of language.

There are many degrees and kinds of creative writing. In stressing the value of the creative experience for the individual, we should not fail to recognize the distinction between effective and scholarly writing and the rare creativity of great writers.

Conditions conducive to creative writing are many: stimulating experiences and time for contemplation; an atmosphere of acceptance and approval; discrimination between what is good and what is best; opportunity to share one's creative writing with teacher and classmates; and evidence of progress.

There are also specific stimuli to effective writing, such as a goal or purpose, new experiences, a film, assignments that call for original response. Genuine creative work needs to be recognized, reinforced, and rewarded. Order and discipline are necessary but are not to be attained at the cost of spontaneity and inspiration.

The teacher creates a favorable atmosphere by welcoming original ideas, recognizing talent, and providing opportunities for creative expression. He shows genuine appreciation of insights and unusually effective words and sentences in the pupils' speaking and writing, thus holding up the

³¹ Hughes Mearns, *Creative Power*.

mirror, as it were, to their creative potentialities. He maintains standards of excellence in the finished product and may give opportunities for recognition through publishing students' poems and other writing or having them read in an audience situation.

Most creative writing in classes stems from a teacher who recognizes and delights in students' originality and felicity of expression. One of the most successful teachers showed these qualities: sensitivity to her environment (she had not lost "the wonder of the world"), genuine joy in seeing children develop, understanding of their interests and feelings, an accepting attitude coupled with skill in giving each child the kind of criticism that would be most helpful to him. She also used varied resources to stimulate originality and varied means to give recognition for exceptional products. One indication of her success was that her pupils maintained their interest in creative writing.

Some people would say, "Such teachers are born, not made." This is true, to some extent. However, other teachers may be helped by seeing these successful teachers in action—in the classroom, on television, or in educational films. Even concrete descriptions of the methods they use would be helpful to others. Certainly some of the procedures and resources used by such teachers could be applied much more widely on every grade level and in various kinds of writing classes.

Gifted children tend to express themselves with intensity and vividness; their language has a poetic quality. Whether they develop this gift and actually do creative writing depends a great deal on the opportunities they have to be original, the appreciation they receive for genuinely creative work, and their willingness to accept the self-discipline as well as to make use of the inspiration needed in writing.

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CHAPTER EIGHT

Reading Aspects

WALTER B. BARBE

Curriculum adjustments for gifted children may take diverse directions, but *differentiated reading must be the means by which most of these adjustments are made.* The same reading assignment for all students, regardless of their reading levels or mental capabilities, may be the traditional method of teaching, but this does not provide an adequate education for any student. When the same reading assignment is given to all students, even the average student is deprived of the enrichment which diversified assignments could provide.

No skill is more important for obtaining information than reading ability. The early development of effective reading is, therefore, not an end in itself; it is a means to provide the student with the necessary skills to obtain information which he will need later. Reading must also provide pleasure as well as information. Only when reading skills are mastered, can the student truly enjoy both the process and the results of reading. Reading instruction is directed to this end.

Gifted students, almost by definition,

are academically inclined. Only in rare cases are they able to satisfy their great desire for knowledge by some means other than reading. Recognizing the truth in the saying, "ability begets interest," the teacher has the responsibility to be certain that all students, and gifted students in particular, learn the skills which make it possible for them to be effective readers. Respect for good books and love of both the process and the results of reading assure us that the gifted student will not end his education when he finishes school. His gift, then, can be constantly developed so that full realization of it does not have to depend upon formal schooling alone but may occur at any time in his life.

In considering reading aspects for the gifted in this chapter, we have had to consider the total reading program for all students. The reading program for the gifted is not something set apart, different from the reading program for other students. It must be an integrated part of the enrichment program "to bring about the maximum development of every boy and girl in terms of his unique nature and needs."¹

Recognizing the importance of reading emphasizes the need to reevaluate constantly our methods of teaching reading. Since reading is the means by which students will obtain most of their information, the teaching of this skill must be as effective as possible. Only through differentiated instruction can the reading ability of the gifted students be fully developed. The usual procedure of the same assignment for every student will not provide the results which the gifted student needs.

Attention is directed in this chapter to the relationships between giftedness and reading ability, for the very means by which we identify giftedness often rely heavily upon the child's reading ability. Research relating to the reading of gifted students at the elementary and secondary school levels will be reviewed briefly in order to provide a better understanding of the reading of gifted students and of the need for curriculum adjustments. The implications of this research are of utmost importance. Problems of the gifted student and his reading will be discussed in terms of avoiding or solving them in specific reading programs. Since learning to read is a continuing process from the first through the twelfth grades, specific curriculum practices at these levels are discussed.

GIFTEDNESS AND READING ABILITY

The nature of the reading process immediately associates it with giftedness. Just as vocabulary has been identified as the best single indicator of intelligence, good reading ability and a wide variety of reading interests have become characteristics of those school children identified as

¹ Paul Witty, *Reading in Modern Education* (Boston: D. C. Heath and Company, 1949), p. v.

gifted. There are many exceptions to this generalization, but most gifted students are avid readers of a wide variety of materials.

Giftedness and good reading ability are related for several reasons. Such factors as visual maturity and auditory perception contribute to this relationship. Although individual intelligence tests are less influenced by reading ability than are the group tests, even the individual tests depend to a great extent upon the ability of the individual to understand reading material. The development of *nonverbal tests having no reading items* has made little change in the attitude that giftedness is in some manner the ability to perform well in verbal areas.

Care must be taken not to overgeneralize about gifted children, but perhaps no characteristic is found more consistently among those children identified as gifted than good reading ability. Although the tests depend much upon reading ability and vocabulary and the person who reads a great deal will naturally acquire more knowledge, most likely the ability to read well is itself a manifestation of the gifted individual's interest in reading as a means of obtaining desired information. The result may, therefore, be of primary importance, but as the skill is developed, the process itself becomes enjoyable to the individual.

Research clearly indicates a high correlation between reading ability and I.Q. as obtained on group tests. The usual correlation found is about as high as the correlation between two group intelligence tests. Years ago, when group intelligence tests were first gaining popularity, a college professor found that the results obtained on a reading test were as good a predictor of success in his college class as was the group intelligence test. This led him to state that perhaps the two tests were actually measuring the same thing.²

When correlations are found between group intelligence test scores and scores on each of several parts of a reading test, the same results are obtained. In one study,³ high correlations were found between the intelligence test scores of a number of high school students and each of the various reading subtest scores, except between I.Q. and reading rate. This may have been caused by the manner in which reading rate is usually measured on standardized reading tests, or it may actually indicate that a rapid reading rate is not a characteristic of the gifted student when he feels that the material he is reading is of great importance. Attempts to raise group intelligence test scores by increasing reading rate, however, have not been successful.⁴

² L. W. Webb, "Ability in Mental Tests in Relation to Reading," *School and Society*, Vol. 11, May 8, 1920, pp. 567-570.

³ W. B. Barbe and W. H. Grish, "Correlation Between Reading Factors and I.Q.," *School and Society*, Vol. 75, March 1, 1952, pp. 134-136.

⁴ W. B. Barbe, "Reading Improvement and Group Intelligence Test Scores," *School and Society*, Vol. 82, September 3, 1955, pp. 72-73.

A comparison of I.Q. scores obtained on individual intelligence tests and those obtained on reading tests also show a high correlation. Probably such a comparison would not yield so high a correlation as that found between reading ability and a group intelligence score, owing to the fact that less actual reading is required on the individual intelligence test. The correlation between nonverbal I.Q. and reading ability is below that of verbal I.Q. and reading ability, mainly because items on the reading test and the verbal intelligence test are more similar than items of the reading test and the nonverbal intelligence test. Such factors as word meaning, word fluency, and comprehension occur on both reading tests and verbal intelligence tests.

Not all good readers are gifted although most of them will likely be. If one's aim were artificially to produce giftedness in an individual, or to make the individual as much like the stereotyped gifted child as possible, emphasis on reading would be the most logical approach. The good reader is more likely to be classed as gifted than the student who is not a good reader, and reading ability can be developed to a higher level in almost every student through special instruction. By emphasizing reading instruction, the student very likely can over a period of time increase his vocabulary and develop a greater background of general information which should result in higher scores on intelligence tests.

The problem which seems to arise with students who are good readers but are not gifted students is that they are frequently expected to achieve at an academic level higher than they are capable of achieving. This is becoming increasingly true with the added attention being given to the academically talented student in the high school. The student with average mental ability but with good reading ability who, with great effort, has been able to achieve at a high level in the regular class is mistakenly being placed in the accelerated class and labeled academically talented. He is often unable to achieve commensurate with his group and may lose even the desire to achieve if he is unsuccessful in the special class and is placed back in the regular class.

Another problem presents itself in stating that most gifted students are good readers. If the measure of a student's reading ability is whether he is reading at or above grade level, then the gifted student is most often a superior reader. But if the measure of his reading ability is determined on the basis of how closely his reading age approximates his mental age, then gifted students perhaps achieve further below their potential level than any other group. This is an academic problem, however, for the goal of few reading programs is to push the reading level of the gifted student up to the level of his mental age. To do so would perhaps be possible, but it would result in a poorer education at the expense of speed.

Gifted students who are not good readers will be penalized, particularly,

on group intelligence tests. For the poor reader, the intelligence test can at best only indicate the lowest level at which the child is potentially capable of achieving. Such test results tell us that the student is at least at the scored level, but it does not tell us how much higher he may be. The student who is able to obtain a high I.Q. score, in spite of poor reading ability, possesses a unique type of mental ability. He may be brighter than even the student who scored higher than he did, but who did so with the added advantage of being a good reader.

Donald Durrell,⁵ recognizing the problem of the poor reader who is required to take a group intelligence test which necessitates much reading, stated: ". . . the group intelligence test involving a great number of reading items should not be used as a basis for intelligence. . . . It appears to be a reading test incorrectly labeled." No exact estimate can be made how great the penalty may be. Certainly, in some instances, the I.Q. handicap for poor readers is far more than just a few points.

The age and grade level at which the poor reader takes the group intelligence test is probably a major factor in determining the extent of the penalty he receives. If the test is administered early in the primary grades, the penalty is not so great, for fewer of the students can read well and, therefore, less emphasis is placed upon reading ability. The longer, students are in school, the better readers they are expected to become, and, therefore, reading ability counts more for a high score on a group intelligence test in the upper grades. By this means, the poor reader in the elementary grades might be penalized many points on a group intelligence test, but if his reading problem were not cleared up by the time he was in high school, the same amount of reading retardation would result in an even lower I.Q. score. Education does not decrease, but actually increases, individual differences. For the student who does not make the normal amount of progress in reading, group intelligence testing is increasingly more inadequate as he progresses through the grades.

RESEARCH IMPLICATIONS

From the beginning of the study of gifted children, attention has been directed toward their reading habits and skills. Lewis Terman,⁶ in Volume IV of *Genetic Studies of Genius*, devotes much attention to the various aspects of the reading abilities and interests of the subjects in his study. Even before Terman began studying gifted children, earlier anecdote-

⁵ Donald Durrell, "The Influence of Reading Ability on Intelligence Measures," *Journal of Educational Psychology*, Vol. 24, September 1933, p. 416.

⁶ Lewis Terman and Melita Oden, "The Gifted Child Grows Up," *Genetic Studies of Genius*, Vol. IV (Stanford University Press, 1947).

tal reporting on the childhood of successful men usually devoted much attention to their precociousness in reading.

Ruth Strang succinctly lists the direction taken by research on the reading of gifted children in the *Psychology of Exceptional Children and Youth*.⁷ She lists four areas in which research has dealt with the superiority of gifted children's reading and two areas in which some gifted children vary from these general tendencies. The areas in which the reading of gifted children follows a general pattern of superiority have been studied more extensively. Strang identifies four such areas:

1. The early age at which gifted children learn to read.
2. The high interest in reading of gifted children.
3. The precocity of gifted children in reading adult books.
4. The intensity of gifted children's reading in particular fields.

The two areas indicated by Strang in which research has found some gifted individuals not to be superior are:

1. Instances where gifted individuals have been retarded in reading.
2. Instances where gifted individuals have used reading as an escape.

An understanding of research findings is particularly necessary when studying the gifted student, for perhaps no other child has been the victim of more myths and superstitions. The implications for educating gifted students have not kept pace with research findings. But because understanding any student is essential before he can be taught, how best to educate the gifted will come from a better understanding of him.

Modern research on the gifted dates from 1921 when Lewis Terman of Stanford University began his monumental study of a large number of gifted children. Terman found that "nearly half of the gifted children learned to read before starting to school; at least 20 per cent before the age of 5 years, 6 per cent before 4, and 16 per cent before 3. Most of these learned to read with little or no formal instruction."⁸ No difference was observed between those in the gifted group who scored at the highest level of intelligence (170 I.Q. and above) and the total group including those referred to as moderately gifted (I.Q. 120—140) in such factors as age at walking, age at talking, and age at puberty. In learning to read before the ages of four and five, however, the high group of both sexes showed more precocity than did the total group.⁹ The proportion reading before four was two and a half times as great for the high group as for the total group. For an unknown reason a much larger percentage of the boys in the

⁷ Ruth Strang, "Psychology of Gifted Children and Youth," *Psychology of Exceptional Children and Youth*, William Cruickshank, ed (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1955), pp. 489-90.

⁸ Lewis Terman and Melita Oden, "The Gifted Child Grows Up," *Genetic Studies of Genius*, p. 25.

⁹ *Ibid.*, pp. 283-284.

high group learned to read before five than did girls in the high group.

The early age at which children learn to read has been substantiated by other investigators. Paul Witty found this to be true of gifted children studied in Kansas,¹⁰ and it was also found in a study of students in Evanston, Illinois.¹¹ Today fewer children may learn to read before entering school because of the pressure on parents not to teach their children to read before they enter the first grade, but no research has indicated that this has changed the general picture to any great extent.

One method which has been used to determine the interest of the gifted student in reading has been to measure the amount of time he actually spends in reading activities. Obviously, the mere asking whether he likes to read would receive an affirmative answer, but to determine the amount of time he spends in nonrequired reading gives a better indication of the extent of his interest in reading. Terman¹² found, as have all other investigators, that the gifted child is an "inveterate reader." At the age of seven the children in Terman's study read about six hours a week, and this increased to about 12 hours at age 13. This is the age at which the gifted student does the most reading in a wide variety of subject-matter and has been referred to as the "golden age of reading." The average student reaches the "golden age of reading" at about 17.

The intensity of gifted children's reading in particular fields often seems overwhelming. Beginning in the early primary grades with books, such as the Walt Disney series and the books of Dr. Seuss, of a fanciful nature with colorful vocabulary, the gifted child soon graduates to true stories and seems to prefer biographies. Often all of the volumes in the *Childhood of Famous Americans Series* (Bobbs-Merrill) and the *American Adventure Series* (Row Peterson) are read by gifted children, even though these two series have more than one hundred titles. From the true adventure type of story of a biographical nature, the gifted student usually turns his interest to specialized topics, such as science. The number of books which gifted children read in this stage is almost unbelievable, and it is not uncommon to hear a gifted child say, "I've read all the books they have in the library about science."

In summarizing the reports of school teachers and administrators throughout the country, one researcher¹³ stated he found, as have almost

¹⁰ Paul Witty, "A Study of One Hundred Gifted Children," *Bulletin of Education, University of Kansas*, Vol. 2, February 1930, pp. 1-44.

¹¹ Walter Barbe, "A Study of Reading of Gifted High School Students," *Educational Administration and Supervision*, Vol. 21, December 1954, pp. 84-87.

¹² Lewis Terman and Melita Oden, "The Gifted Child Grows Up," *Genetic Studies of Genius*, p. 39.

¹³ Eugene Klemm, "Reading Instruction for Gifted Children in the Elementary Grades" (Doctor's dissertation, Northwestern University, 1953), p. 144.

all investigators, that gifted children read much more widely and their selection of books are of a higher quality and at a higher level of difficulty than material read by the average student. One supervisor reported at the junior high level that the gifted read about four times as many books as did the other students.¹⁴

Not all of the research relating to the reading of gifted children has been favorable to the gifted child. As Ruth Strang¹⁵ points out, some gifted children have reading problems and some use reading as an escape from adjustment problems.

In a doctoral dissertation on reading instruction for gifted children in the elementary grades, Eugene Klemm¹⁶ sent questionnaires and received replies from forty-one schools or school systems which were known for having made some provision for the gifted child, particularly in reading. Of these forty-one, thirty-seven recognized that gifted children sometimes had difficulty learning to read and stated that they had specific provisions to help the gifted student who was in need of remedial reading. One of the reports noted that no gifted children in the program had reading problems and another stated that children with reading problems were not considered gifted. One cannot help but wonder how many potentially gifted children have been excluded from receiving challenging material and an enriched program because of this rigidity of definition of the gifted.

The Reading Center in Chattanooga has noted that a large number of bright children from the primary grades are diagnosed as reading problems, even though they apparently have no difficulty with reading at the first grade level, and in some instances are reported to have been reading before they entered school. In an article in *Elementary English*, the writer¹⁷ attempted to explain how some of these problems developed from an over-dependency upon memorizing in the first grade and a breaking down when the material became too long to memorize.

Ruth Strang¹⁸ points out another aspect of this problem in an article in *The Reading Teacher*. She discusses the idea that perhaps more gifted children are reading problems than we realize if we consider that most gifted children's reading is far below their mental ability level. Most gifted children are reading at least at grade level, but should not they be expected to read at the level of their mental ability?

Another problem connected with reading and the gifted child, but not a

¹⁴ *Ibid.*, p. 147.

¹⁵ Ruth Strang, "Psychology of Gifted Children and Youth," pp. 489-490.

¹⁶ Eugene Klemm, "Reading Instruction for Gifted Children in the Elementary School," p. 111.

¹⁷ Waller Barbe, "Problems in Reading Encountered by Gifted Children," *Elementary English*, Vol. 33, May 1956, pp. 274-78.

¹⁸ Ruth Strang, "Gifted Children Need Help in Reading, Too," *The Reading Teacher*, Vol. 6, January 1953, p. 23.

problem of underachievement in reading, is that of using reading as a means of withdrawing from reality. In *Problems in the Improvement of Reading*, Strang¹⁹ et al state: "Occasionally a gifted child uses reading as an escape. . . . Gifted children sometimes find the world of books more satisfying than the real world. Consequently they use reading as an escape from desirable physical activities or developmental tasks." The negativism which results from the gifted student's reading are well presented by Friedman.²⁰ She points out that when the gifted child is told, "You are always reading. Why don't you go out and play?" he must assume that interest in reading is not a desirable thing. Friedman recognizes that a child may be using reading "to isolate himself from the group and thus cover up his fear of failure in group relationships," but she points out that merely because a child reads a lot does not mean that he is necessarily doing this. The same amount of socialization is not necessary for all children. We must recognize that reading is a means for better understanding both of oneself and others.

PROBLEMS OF TEACHING GIFTED STUDENTS TO READ

A number of specific problems arise in any classroom which contains children of different reading levels and varied potential reading abilities. These problems may result either from (1) the capable student's superiority in reading ability which makes him different from the other students, or (2) the capable student's lack of ability in reading which makes him resort to compensatory behavior which disrupts the rest of the class.

The first instance is more common, for the very fact that the gifted student is usually superior in reading ability makes him different from other students and makes curriculum adjustments absolutely necessary. This problem is familiar to every classroom teacher.

In the second situation, where the student is potentially capable of being a superior reader but because of many possible diverse factors, he has not achieved to any degree the level of his ability, the problem is more serious even though it is less common. Quite often the capable student who is a poor reader is never identified as gifted. His poor reading ability blocks most of the usual channels by which gifted children are identified. If the unidentified gifted student has had many years of unsuccessful school experience, there can be an actual loss of I.Q. points on tests and a covering-over of potential ability that may never again emerge sufficiently so that it may be developed.

¹⁹ Ruth Strang, Constance McCullough, and Arthur Traxler, *Problems in the Improvement of Reading* (New York: McGraw-Hill Book Company, Inc., 1955), p. 361.

²⁰ Bertha Friedman, "Brains Should Be an Asset," *Library Journal*, Vol. 80, November 15, 1955, p. 2623.

When working with the gifted child who is a superior reader, the following problems frequently arise:

(1) What should be done about the child who is already reading when he enters the first grade?

(2) When a child's reading level is above that of his grade placement, must he be required to learn the skills at that level, or can we assume that he does not need the skills or has learned them on his own?

(3) How important is oral reading for the gifted student?

(4) How can better reading comprehension be developed among our gifted students?

READING IN THE FIRST GRADE

The first-grade teacher who has prepared a program of readiness activities for a definite portion of the first semester, extending anywhere from six weeks to the entire semester, is faced with a major problem if a child already knows how to read and considers readiness activities meaningless busy work. Before the recognition of individual differences, the child who could already read was able to plunge ahead because formal reading instruction began for all children on the first day of school. But with the recognition that few children were ready to begin formal reading instruction immediately upon entering the first grade, the readiness program was developed. Many excellent teachers now believe that all children should participate in the readiness program.

Since so much more of the first-grade program than just reading itself is connected with the readiness program, the child who is already reading should not be excluded from the readiness activities. But the teacher must remember that the purpose of the child's being in the readiness work is not to prepare him for initial reading experiences, for he has already had these experiences. The objective is instead to prepare him for the type of group activities which mass education makes necessary. This as one of the major goals of readiness is doubly meaningful for the gifted child, who has somehow mastered the learning-to-read process on his own, but who will have to depend upon other types of learning to gain many of the other necessary skills.

The author recently spent some time in a first-grade classroom observing a little boy who had been reading since the age of three. Kindergarten had presented no particular problem since all reading was done by the teacher. As is not unusual for such a child, he enjoyed reading. His parents were concerned that the slow pace of formal reading instruction in the first grade would present some problems for this child, who was already reading at high third grade level. His teacher, however, did not exclude him from the

readiness group. The teacher explained to him and to his parents that even though some of the things which the class was going to cover were things which he already knew, he needed to learn how to work with the other children. On some occasions he was allowed to read to himself while the teacher was working with other groups. On specific instances he was allowed to read to other children and was made to feel he was a contributing member of the class.

Research studies have repeatedly indicated that about half of all children with I.Q.'s above 130 are reading before they enter the first grade.²¹ The usual belief is that an overzealous parent taught the child in preparation for the first grade. This is not always the case and is probably less true today than it was in past years when parents were uninformed of the possible bad after-effects of such a practice. How some of these children learn to read cannot always be determined, but we know that some gifted children do learn to read without receiving any formal reading instruction. Learning to read road signs, cereal boxes, and television commercials is not uncommon.

The problem of children who have learned to read before they entered the first grade is more common in localities where the law rigidly fixes the entrance age of children. This practice, while definitely beneficial for most children, is a handicap for gifted children who are otherwise ready for school, but whose birthdays fall soon after some arbitrarily set date. Those children who are ready, but cannot enter school for another year because of the age limitation, frequently learn to read before the following year and are then bored by what seems to be meaningless readiness activities.

The solution to this problem would seem to be a flexible law governing the entrance age of children. For most first-grade children, obtaining the age of six early in the fall is a satisfactory requirement; but in those special instances where the child is not aided by such a law, some systematized manner in which exceptions can be made is needed. The usual pattern in instances where exceptions are made is to refer the child to a psychologist and if the child appears advanced mentally, physically, and emotionally, then he is admitted to school early. Making such exceptions prevents many of the difficulties caused by the child's knowing how to read before he enters the first grade.

In an article in *Exceptional Children*, Birch²² lists the information which is obtained in Pittsburgh before early entrance for gifted children is recommended by the school psychologist. Other school systems might be able to follow a similar procedure.

²¹ Bertha Friedman, "Brains Should Be an Asset," p. 2624.

²² Jack Birch, "Early School Admission for Mentally Advanced Children," *Exceptional Children*, Vol. 21, December 1954, pp. 84-85.

1. Evidence . . . of superior social maturity. . . .
2. Evidence . . . of superior emotional maturity.
3. Evidence . . . of reasonably normal height and weight and robust physical health.
4. Evidence . . . of superior reading aptitude. . . .
5. Evidence . . . of superior mental capacity (I.Q. approximately 130). . . .
6. Knowledge of the general characteristics of the first-grade population and instructional program of the school the child will attend.

Other solutions might be to group those children who are already reading into one class or to provide other material, such as foreign language instruction, at the time the rest of the group is being taught reading. Administrative devices are, at best, only an aid for adequately providing for individual differences which must ultimately depend upon the skill of the classroom teacher.

The influence of television on the preschool child should not be underestimated. With children watching television more than twenty-one hours each week,²⁵ probably many of the usual first-grade activities are being provided by television. If this is so, the time needed for readiness activities in the first grade can be cut down.

In any event, we must recognize that the bright child who enters the first grade already reading presents a problem, and encouragement should not be given to parents to teach the child to read. But if the child is ready to read earlier, and learns to read on his own with no more formal instruction other than answers to his questions as to what particular words are, then he should not be discouraged. Some children are ready to read early, and if the learning is delayed too long, they may become tired of waiting and turn to activities other than reading for their enjoyment. Upon entering the first grade, however, even though the child is reading, he should nevertheless participate in many of the readiness activities. If these activities are varied, the gifted child's interest can be maintained.

THE IMPORTANCE OF READING SKILL INSTRUCTION

Every student needs to learn the word-attack skills (such as phonics, rules of syllabication, and prefixes and suffixes), comprehension skills, and vocabulary-building skills (such as root words and semantics) which are taught at each grade level. Many gifted students are capable of reading at or above grade level without having learned these specific skills formally, or perhaps without having learned them at all. The question is,

²⁵ Paul Willy, "Some Results of Eight Yearly Studies of T.V.," *School and Society*. Vol. 86, June 21, 1958, pp. 287-89.

therefore, if the gifted student can read at a particular level, why should he learn skills in order to do what he already knows how to do? The answer would indeed be easily given if the skill being learned were directly related to the reading level of the student. The relationship, however, is not direct, and often the skills being learned in reading at a particular grade will not be needed by the gifted student until some later time when he is reading material which is more difficult.

The argument against grade-skipping as an advisable practice for gifted students is that they will miss certain basic skills in reading which are presented at each grade level and which are important to them either then or at a later date. If the child skips over these skills, he may be able to read at the higher level, but he will not have the background for handling certain reading situations as effectively as he could have had he received the skill instruction. If the child is to be grade-skipped, care should be taken to present all of the skills which would have been presented in the normal sequence. The gifted student can cover these skills more rapidly, but merely because he is able to read above grade level does not mean that he has mastered all of these skills.

Reading skills, unlike arithmetic skills, do not follow a rigid sequence, one being dependent upon the other in some empirical fashion. A student cannot understand multiplication without first mastering addition. This dependency of one step upon the other is not true in learning to read. Some students, usually the gifted, are able to read several grades above their actual grade placement, but they do not know the skills even up to their grade level. Such a student may be able to continue this practice successfully through the elementary grades, and sometimes even through high school, but he may eventually encounter difficulty in reading because of lack of knowledge of certain basic reading skills. Possibly the student will never know what it is that is giving him difficulty because he has for so long been considered a superior reader that he fails to realize that his difficulty is due to a lack of knowledge of reading skills.

Another reason for teaching the gifted student the reading skills he does not know at his grade-placement level is that these skills are not just techniques for better reading; they also apply to all of the language arts area. Research indicates that the gifted student is not superior in spelling ability although he is superior in reading. This may be because he does not appear to need phonics since he can already read at grade level—while the fact that phonics also aids the student in spelling is overlooked.

How can the student read above grade level without knowing the skills at that grade level? In the earlier primary grades part of the answer is in the dependency of the gifted student upon his superior memory. He is able to learn by the sight word method without needing any of the aids of word-attack skills; and he would, therefore, miss any skill instruction if the

teacher were to assume that skill instruction were only for those who could not read at grade level.

How much time then should the gifted student spend learning the basic skills in reading? He should learn the same skills all children are expected to, but he should be expected to learn these faster than the average child. If he already knows the skill being taught, then he is ready to move into more reading and use of this skill, but not to move on into a higher grade level skill. This, of course, raises the problem of using higher grade level books for the child who is reading beyond grade level. If the philosophy of the school is to enrich vertically, and to put the child through school at the fastest possible rate, then he should be moved into more advanced material. But, if the philosophy of the school is to enrich horizontally, rather than merely to go faster, the policy generally should be against using basic readers of a higher grade level. Some subjects allow for vertical enrichment more easily than reading does. Although the use of vertical and horizontal enrichment is controversial, the author's opinion is that for reading skill instruction, enrichment at the child's grade level (horizontal enrichment) is wiser than moving him into higher grade level skills (vertical enrichment). The gifted child will, of course, be inclined to choose library books of a somewhat higher level and be able to do research work using adult encyclopedias; this should not be discouraged. *The use of textbooks from higher grades only creates an unnecessary problem, however, when the child reaches the higher grade.*

In many situations the gifted child is now allowed to skip over reading skills because he is considered a good reader who does not need to work on skills. This is a dangerous practice, for the time may come when the gifted student will need the particular skill in either reading or spelling and will not know it. Gifted children, like all other children, need skills upon which they can rely when their memory or innate ability is pushed to the limit. As the gifted student continues through school beyond the elementary grades, there is more and more dependence upon skills and less dependence upon memory. If the gifted student has the reading skills, he will be in a better position to read effectively; he is not likely to take the time and effort to go back and learn those skills which were missed in the elementary grades, even though he may discover a need for them.

THE IMPORTANCE OF ORAL READING

Oral reading is not one of the major goals of reading instruction, but from the amount of time spent on it in some classrooms it would appear the most important part of reading. Comprehension is, of course, the ultimate purpose of reading instruction; the goal of liking to read is

closely behind. Too often, gifted students become bored with oral reading assignments because of the long periods of time spent as less capable students stumble along through the material while every other student "keeps the place." Gifted students usually like to read aloud themselves, for they naturally like the attention which they receive from doing a task well. But when the gifted student must be exposed to listening to the oral reading of every other student on some false belief that this is fair, the gifted student can righteously rebel.

The value of oral reading as a means of sharing with others some particular part of a story or poetry is realized only when the individual doing the reading is able to read well. There is no beauty in a poem which is read haltingly with time taken out while the student attacks a new word or is told the pronunciation of a word. Only when the student can read aloud fluently and with expression, is oral reading an effective means of developing an appreciation for a particular piece of literature.

Oral reading has a more important place in the primary grades than anywhere else; its importance decreases as the student continues through the grades. The gifted student, because of his unusual precocity in reading, passes through the stage of depending upon oral reading more quickly than does the average student. He, therefore, should not be expected either to read aloud as much as other students, or to have to listen to others read aloud. By the time the gifted student is in the upper elementary grades, oral reading from the basal reader is used only to check the child's reading ability and occasionally to share material with others. The use of dramatic readings and choral reading are more effective means of enriching oral reading.

DEVELOPING BETTER READING COMPREHENSION

The major goal of reading instruction is, of course, developing adequate comprehension. Gifted students present a somewhat more difficult problem in developing good comprehension than do other students. Because of the gifted student's superior memory, the teacher must use caution in wording his questions. The gifted student can rely entirely upon memory unless the questions make him think and prepare him for the comprehension skills which are so necessary at the higher grade levels.

The usual type of comprehension question is either "How much?" or "How many?" For the average student, whose memory is not as effective as the gifted student's, to remember how much or how many will require some thought and actual use of the skills of comprehension which he has learned. For the gifted student to remember answers to such questions is no effort; it merely requires that he use his innate superior memory which

he has found will enable him to do well on the usual type of comprehension checks.

Obviously, the comprehension question which requires the most thought, and which is actually the question of the gifted student himself, is simply, "Why?" Instead of being concerned only with quantitative factors, the qualitative factors are of greater importance. In answering the question, "Why?" the gifted student must certainly remember the facts, but he must also analyze the facts which he remembers and come up with his own conclusions.

GIFTED STUDENTS MAY HAVE TROUBLE LEARNING TO READ

In addition to the many problems of teaching reading to the gifted student who is achieving in reading, the classroom teacher must also be aware of the problems of the gifted student who is not achieving in reading. These questions arise when a student is identified as gifted but is found to have reading problems:

- (1) How can a gifted student have difficulty in reading?
- (2) What can be done for the gifted student who is not a good reader?

The very principle of individual differences explains how a gifted student can have difficulty in reading. The same emotional stresses and physical problems, which some average children have and which affect adversely their learning to read, also are present for some gifted children. The seemingly insurmountable obstacles are overcome by some average children and are even more often overcome by gifted students. But some gifted children do not surmount the obstacles, and they have difficulty learning the technique of reading. Instructional causes of reading problems, however, are not found so often among gifted children as they are among the average group, for gifted students have a propensity for learning.

No remedial reading problem is more easily corrected than that of the gifted student who has encountered difficulty. Presentation of the skills is essential, but this is only routine and should not be the major emphasis of such instruction. The gifted student's ability in verbal areas such as word fluency, vocabulary, and verbal reasoning usually makes teaching him to read a relatively simple process. Individual attention is often necessary, for the gifted student, as other students, may sometimes be a victim of mass education. But with individual attention progress is usually rapid. Sometimes the real value of reading as a fact gathering technique must be demonstrated. Usually with only a minimum of attention to this aspect of reading, the gifted student is able to take over and almost correct the difficulty himself.

Because emotional problems hamper the reading skill of some gifted

students, planning any successful remedial program for the gifted requires a consideration of the child's emotional make-up. Actually, effective remedial instruction often aids in overcoming emotional problems.

Good teaching, which recognizes individual differences of children and is flexible enough to make adjustments to provide for these differences, will overcome the reading problems of most students. An examination of the various types of curriculum practices throughout the United States in the elementary and secondary schools clearly indicates that reading is of concern in all schools. A study of what other systems are doing should suggest better ways to provide for the reading of gifted students in any particular school.

CURRICULUM PRACTICES IN THE ELEMENTARY SCHOOL

The elementary school traditionally has done more to recognize individual differences among children than has the high school. The extent to which this recognition has been put into practice, however, particularly when applied to meeting the needs of gifted children, is limited.

Elementary school teachers are the first to admit that with the pressures brought about by large classes and overcrowded schedules, the gifted child is the one most often neglected. The need for attention to the slow learner who is having difficulty is so much more apparent that the conscientious teacher, in trying to do the best possible job, often overlooks the gifted child because his need for help in reading is less obvious.

Two distinct administrative practices have developed in the modern elementary school to provide for individual differences in reading ability. One is to provide for the gifted child who is a good reader within the regular classroom by enriching the curriculum so that the gifted child is challenged. The other method is to provide special classes, either part of the day or the entire day, for those children who have been identified as gifted.

Enrichment Within the Regular Classroom

The principle of grouping within the classroom has been adopted as essential for teaching reading. This is the crux upon which modern educational methods in the elementary school are based. The developmental reading program has as its main tenet teaching each child at his actual reading level. Whether this is done individually or by dividing the class into groups, the basic principle is to recognize the individual needs of the children by making curriculum adjustments to meet these needs.

To group children for reading within the regular classroom, the teacher

must first believe in the developmental philosophy which is an essential part of most of the educational practices of today. A teacher who disagrees with this philosophy will soon discover that teaching of just fifth-grade material, because she happens to be a fifth-grade teacher, is neither effective nor even possible.

Placing children in the proper groups is a major first step in providing enrichment in the reading program. Once the children are in the groups, the selection of material to be read and skills to be learned will determine whether the grouping is for the benefit of the children or the teacher. The enrichment actually takes place when the teacher makes the assignment or directs or stimulates the students to undertake their reading. Neither merely assigning material to be read silently, nor having the children take turns reading aloud to one another is enrichment. Enrichment is the intentional differentiating of assignments to meet the particular needs and to develop the interests of each child.

More important than the size of the group is the range of abilities within each group. In some instances a group will consist of the entire class, while in others the group may contain no more than one student. The traditional three group pattern, roughly dividing the class in three parts, may well be the beginning point for grouping. From these groups, however, the teacher must provide great flexibility both in composition of the group and in purpose for the group. For skill instruction, obviously each group should contain those children who do not know the specific skill which is to be taught. For developing new interests, the teacher may intentionally bring together children whose interests vary greatly. When the teacher is uncertain about how to group on ability, the children are often quite capable of grouping themselves.

As was mentioned earlier, the gifted child will primarily make his own curricular differentiation through reading. Klemm²⁴ found, in a study of the provisions made in reading for the gifted child in elementary schools throughout the United States where special provisions are made, that in the majority of cases enrichment within the regular classroom was the procedure. He stated, however, that "the results of this study seem to support the position taken by many educators that programs of enrichment *plus* limited acceleration offer the most practical means of providing for gifted children."²⁵ Depending upon enrichment alone does not seem to solve the problem of reading instruction for the gifted; for Klemm states, "Successful application of the principles of adequate enrichment programs may be found in isolated classes, or in particular schools, but they seem almost

²⁴ Eugene Klemm, "Reading Instruction for Gifted Children in the Elementary Grades" (Doctor's dissertation, Northwestern University, 1953), p. 72.

²⁵ *Ibid.*, p. 72.

certain to be inadequate for every gifted child during every one of his elementary school years."²⁶

The disadvantages of grouping within the regular class alone are not insurmountable. Nevertheless, disadvantages do exist, and any denial of their existence is unrealistic. To begin with, the regular classroom teacher has difficulty finding time to make all of the preparations necessary to challenge each of the many different levels of ability and interest in the regular heterogeneously grouped classroom. This assumes that even if the teacher had the time and the materials, he would know enough about the children and teaching methods to make appropriate preparations. Another problem arises from the attitude of other children as they see the gifted child receiving attention and assignments which seem more interesting than those given to them.

But in spite of these disadvantages, the skilled teacher has been able to provide for all children, and particularly for those who are superior in mental ability, within the regular classroom. Since this is the primary way in which the reading of most gifted children in elementary schools is being taken care of, we must understand as much as possible about how this is done.

Usually the gifted child in the top reading group in a class is presented the same reading skills as the average child although less drill on the skill itself is necessary. The time thus saved or left over from the presentation and practice on skills is then spent on enrichment activities but not on learning skills in the next higher grade-level book.

Enrichment activities in reading do not necessarily have to come from the reading textbook itself, although common practice is to have the gifted student read at least one of the basic texts of his particular grade level. Emphasis is placed upon a basic reading text because the lessons are carefully developed and present a balance between basic reading skills and practice on these skills. In most of the leading basal reading series, suggestions for enrichment activities for the gifted students are made in the teacher's manual.

Klemm reports on some of the enrichment activities mentioned by people teaching reading to gifted students in various elementary schools. The not unusual but often effective procedure of allowing gifted children to go to the library at any time when they have finished their regular work is mentioned.²⁷ In one instance the gifted students, who, incidentally, make more use of audio-visual aids than do any other group and are often required to depend mainly upon free materials because of limited funds, took the responsibility themselves for locating, obtaining, storing, and using

²⁶ *Ibid.*, p. 70.

²⁷ *Ibid.*, p. 163.

materials other than the regular textbooks.²⁸ Another teacher provided an "activity list" to supplement each unit of work in social studies. The list suggested, as appropriate, "books to read, maps to make, cartoons to draw, and original stories to write."²⁹ A very challenging lesson in vocabulary development was provided by a teacher who had each of her students take a paragraph from a favorite story and rewrite the paragraph changing the vocabulary without changing the meaning.³⁰

Whether the reading instruction for the gifted child is provided in the regular classroom or in some special group, enrichment is an essential feature of the program. Grouping gifted children together to make instruction easier for the teacher does little if anything to provide a better reading program for the gifted. Enrichment, so essential to all programs, has been defined by Theodore Hall as not different in kind, but in degree, from those things found in the regular, traditional classroom. He says, "The difference here is the way they are done. . . . Enrichment very particularly means the breadth of interest, and depth of attention and understanding, that these gifted children can bring to a single theme."³¹

Special Classes

The curriculum adjustments by which reading is taught to gifted children in special classes vary greatly. One such adjustment is to take children from various grades and to teach reading to all of those who are on the same level. This means that the children leave the regular classroom for the period of reading instruction. This is varied in smaller schools by grouping children from several grade levels into one reading class, or in larger schools by grouping into classes for reading instruction all children who are reading below grade level. Another technique is to group all bright children into special classes for all instruction, and to teach reading to these bright students through a more or less individualized approach. In addition to these more elaborate methods, many schools use special interest and special ability groups which meet only occasionally but which provide enrichment in the reading program for gifted students.

One widely publicized plan is the Joplin, Missouri plan³² for teaching reading to children placed in classes with other children at their reading level, forgetting grade placement and considering only reading level. For one period each day, children in the upper elementary grades change

²⁸ *Ibid.*, p. 133

²⁹ *Ibid.*, p. 162

³⁰ *Ibid.*, p. 197.

³¹ Theodore Hall, *Gifted Children, The Cleveland Story* (Cleveland: The World Publishing Company, 1956), p. 64.

³² Roul Tunley, "Johnny Can Read in Joplin," *Saturday Evening Post*, Vol. 230, October 26, 1957, pp. 27, 108, and 110.

rooms and go to a teacher who is teaching reading to all upper elementary children reading at that level. In this way the range of reading abilities in a classroom is only one year, the children are all in need of approximately the same type of skill instruction, and a great amount of time is saved by having to teach only one group.

A similar plan was begun in Chattanooga, Tennessee at the same time as the one in Joplin, Missouri. Although originally the Chattanooga students in the fourth and fifth grades who were reading above grade level were allowed to join those sixth-grade students who were reading at the higher grade level in an enrichment group, this practice has been discontinued. Even though the students could read above their grade level, the experiences of the students were of such a different maturation level that working with students above their grade level was not practical. Now the policy is to keep a child at the higher section of his grade level, rather than moving him ahead although those reading below grade level are moved back with children one and two years younger at the same reading level.

Departmentalization of reading is like the platoon system in operation in some schools. This is a modification of the self-contained classroom in such a manner so as to provide administrative ease in teaching skill subjects as well as to assure that a specified amount of time is spent on reading.

A new method of teaching reading to gifted students is to include in the schedule of the special-reading teacher, classes for the mentally superior student. The original idea that the special reading teacher was only for remedial cases has been changed to include a responsibility for the reading of the bright student as well as the slower student. In some instances the special reading teacher works with the bright students in reading and provides an enrichment type of experience while the regular classroom teacher works with the slower learner. A major advantage of this method is that the regular classroom teacher, who knows the child better than the special teacher does, is more effective with the remedial reading problem than would be the remedial teacher. Because of the pressures from the other students, however, the regular classroom teacher has not been able to devote as much time to the poor student as he can under a program in which the better readers leave the room for a period to work with the special teacher.

In recent years, more attention has been directed toward individualized reading programs. Such programs have many advantages, particularly for the child who never encounters any difficulty with the reading process and for the child whose reading program is in need of enrichment. This method may be a partial answer for gifted children. The big question is, of course, whether the reading program should be individualized completely or whether some partial individualized program is followed. In many situations teachers have followed a partially individualized reading program without realizing that their practices have drawn so much attention. The

major problem connected with the individualized program is the skill demanded of the teacher in operating it. The teacher may not know how to manage the development of certain skills if he has not previously had experience in the more formal methods of teaching reading.

The Association of Childhood Education has published an article on the many advantages of the individualized reading program.³³ Many problems are overcome not by grouping on ability or achievement, but instead by grouping only when necessary and then on any one of several bases. The "more mature readers" are, therefore, not grouped together, but by means of their self-selection of material receive appropriate recognition. The development of reading skills is accomplished individually and must depend to a great extent upon the ability of the teacher to teach these skills.

The manner in which the library has been used as a learning laboratory for gifted elementary students has followed several patterns, and such work has been effective. In a report on a special library class for rapid learners in the sixth grade, Wilson concluded that "more boys and girls should be given work of this sort and that more time should be devoted to it."³⁴ In this program, which was sponsored jointly by the Public Library and the Los Angeles Board of Education, ten one-hour sessions were held on alternate Mondays in the children's section of the main library. The sessions began by exploring the special interests of each of the children. "Thereafter, each meeting included a special book, a magazine article, an idea to pursue, and a news reference for each child—things that would appeal especially to him and that might broaden his reading interests."³⁵ Wilson reports that every meeting was "crammed" with new information. The six most important lessons were:³⁶

1. Efficient card catalog use.
2. Use of magazine guides.
3. Principles of developing their own book collections and wise book buying.
4. Training in taste. (This was teaching critical thinking.)
5. Locating and using maps.
6. Understanding the audio-visual department.

One of the best examples of the enriched program for gifted students in the elementary school can be found in the Major Work Program of special classes for gifted children in the Cleveland Public Schools. Com-

³³ Grace Garrettsen, Irene Whitcomb, and Bernice Tenneer, "Through Self-Selection—Progress Unlimited," *More About Reading*, Margaret Rasmussen, ed., Reprint Service Bulletin No. 29 (Washington, D.C.: Association for Childhood Education International, 1959-60), pp. 12-17.

³⁴ Adelaide Von Brum Wilson, "The Library Helps the Rapid Learner," *Library Journal*, Vol. 80, November 15, 1955, p. 2628.

³⁵ *Ibid.*, p. 2626.

³⁶ *Ibid.*, p. 2627.

binning features of the individualized reading plan with the more traditional type of group presentation of reading skills, Major Work students learn in reading clubs. They use as their guiding principle that what one reads is not important; the important thing is instead, "What I think and feel about what I have read." Through the reading club, the gifted students share the enjoyment of reading many different books, and they are able to develop both the appreciation for good literature and the ability to read this material in the most efficient manner.

Various means are used to provide gifted students with an enriched reading program. Some of these methods cannot be used in all situations, but by accepting enrichment as the basic requirement for the reading program for the gifted student, adaptations can be made which can be successful.

READING IMPROVEMENT FOR GIFTED HIGH SCHOOL STUDENTS

For many years the teaching of reading was thought to be the task of the elementary school alone. Either the student learned to read effectively in the elementary grades or he never learned. High school teachers stated that they did not know how to teach reading and could do little for the student who had failed to master this all-important skill.

In the past few years, however, more high schools have been recognizing that they have a responsibility not only to assist those students who may have failed to learn to read well in the elementary grades, but to teach new reading skills at the high school level. Such new skills include increasing the reading rate, learning to adjust the rate to the purpose for which the material is being read and also to the level of difficulty of the material, being able to read critically, and developing a larger vocabulary. The idea is incorrect that all reading skills have been learned by the time the student finishes the sixth grade level.

Reading in the Regular Class

The philosophy that every teacher is a teacher of reading has extended upward from the elementary grades. No longer is reading just another subject in the curriculum; it is a part of every content subject. Often without realizing that he is teaching reading as such, a teacher of a high school subject will first present the new words in the material. In doing so, the meanings of the words are developed, and the student learns how to spell the words by noting the root words, prefixes, and suffixes. The content material is read silently and, under certain circumstances and for specific purposes, oral reading may then be assigned. A follow-up or evaluation

comes next. These are the steps in a directed reading activity, but they are often not identified as such by the teacher of a content subject who assumes that he is just teaching his own subject and is not teaching reading.

In addition to the incidental teaching of reading to all students in content subjects, the high school English teacher has often assumed the responsibility for teaching reading either as a unit in the regular program or on one or two days of the week at the regular English period. For many of the gifted students, this type of reading instruction has been highly successful. It has been less successful with remedial reading problems than it has with the enrichment type of reading program, however.

When discussing the ways in which high school English teachers in Houston, Texas provided for the gifted student in the regular literature class, Ruth Reeves²⁷ defined gifted students as ". . . any students whose capacities are above the average, who react with verve to abstract ideas." Recognizing that the gifted student is not always challenged, she summarized the ways in which they might be challenged: ". . . now and then, with forethought, some creativity, an individual conference, a well-stocked library, we challenge these students to use their powers."²⁸ The methods Houston teachers used were regular class work, small group work, and individual conferences.

When such reading classes are a part of the regular English class, certain basic principles have evolved which seem to be essential for a successful program. Programs which do not consider these basic principles are sometimes equally successful, but they are more often than not dependent entirely upon the personality and drive of an individual teacher, rather than the type of program which could be fairly certain of success in any high school English class. Some of the basic principles are:

1. The program must begin with adequate evaluation of the reading needs and levels of each student.
2. The program must be organized with respect to the number of periods per week and length of each period.
3. The teacher must know the skills which he is trying to develop and have special materials available which will assist in the presentation and practice of these skills
4. The improvement of reading must be accepted by the entire faculty and the students as an important part of their high school program.
5. Methods by which progress is measured are needed, and results must be made available to the students.

The incidental teaching of reading in an English class usually results in

²⁷ Ruth Reeves, "The Gifted Student in the Literature Class," *The English Journal*, Vol. 45, November 1956, p. 469.

²⁸ *Ibid.*, p. 462

little more than a repetition of those things which the bright students already know and an ineffective review of the things which the poor reader failed to learn earlier. Such a program does not do any actual harm to the gifted student, but neither does it help him. An incidental program may actually be a detriment to the poor reader because it once again impresses upon him his difficulties without actually doing anything to correct them. A carefully planned program in the regular English class can be highly successful for all students.

The Special Reading Class

In *The American High School Today*, James B. Conant³⁹ recognizes the need for a developmental reading program. He states: "A school should have the equipment for a developmental reading program. The program should be available on a voluntary basis for all the pupils in the school. The counselors and teachers of English should be asked to view this program sympathetically and to urge students to take advantage of the opportunity to increase reading speed and comprehension."⁴⁰ Conant explains that this is not the remedial reading program for slow readers; it is instead designed to make better readers out of good readers. The aims, as Conant sees them are:⁴¹

1. To help students acquire skills in different sorts of reading, from close and detailed reading to scanning.
2. To increase reading speed.
3. To improve comprehension of the material read.

Conant believes this program to be important enough to include it as one of his twenty major recommendations for improving the American high school. In his school visitations he found that many high schools were already offering such a program for their superior students.

One hindrance in establishing the developmental reading class for the gifted high school student is the attitude that the gifted student is usually a good reader and therefore does not need further help. This is a variation of the long-held attitude that if the gifted student is so smart, why does he need any special attention. The answer to this is, of course, that the gifted student does somehow manage to do very well in spite of being neglected, but for the full realization of his gift, special attention must be forthcoming. Merely getting by is not good enough for the gifted student.

The gifted student usually makes greater gains in reading ability in a special reading class than does either the average or slow student, even if

³⁹ James Bryant Conant, *The American High School Today* (New York: McGraw-Hill Book Company, Inc., 1959).

⁴⁰ *Ibid.*, p. 67.

⁴¹ *Ibid.*, p. 67.

he was reading better than any of the others initially. Doubling of the reading rate with no loss in comprehension is not uncommon for such a student.

The junior high school is not too early to improve the reading of superior students. Huettner and Hosmanek⁴² outline a program for this end that has been in operation at South Side Junior High School in Sheboygan, Wisconsin. They believe that the areas of concern in such a class should be comprehension, appreciation, evaluation (critical reading), and speed. The class at South Side Junior High School is an accredited elective in the ninth grade, limited to twenty students who, it is believed, will benefit most from it.

Recognizing the need for the gifted to learn how to "evaluate their activities—not only those concrete and easily witnessed, but also those involving abstract ideas and concepts," Ryan⁴³ reports on an experiment in a junior high in St. Paul, Minnesota. The control group read on a voluntary basis only, but the experimental group did special reading, did research for other students and for teachers, and studied about reading skills in order to coach some fourth grade students who were having difficulty in reading. A comparison of the control and experimental group clearly showed the superiority of the experimental group in reading improvement as measured on the Stanford Achievement Test.

Ryan recognizes that all special programs which draw attention to reading usually result in better reading, but the somewhat unique feature of this program was the use of superior junior high students to tutor fourth grade children having difficulty in reading. Unfortunately, the only mention we have of the effect of this tutoring on the fourth-grade students is a statement that "the fourth graders enjoyed them as helpers. . . ."⁴⁴ The use of superior or gifted students as teacher-helpers has never been adequately studied. More needs to be known about its effect upon the children being helped and their reaction toward the student teacher. Unquestionably this procedure is valuable in terms of improving the reading of the student teacher, for it is a well-established principle that the best way to learn anything is to teach it.

At Central High in Chattanooga, Tennessee, as part of the general developmental reading program,⁴⁵ classes for members of a "pilot group" were offered. The pilot group at Central consisted of those academically

⁴² Otto F. Huettner and John J. Hosmanek, "A Reading Program for the Superior Student," *Bulletin of the National Association of Secondary School Principals*, Vol. 41, March 1957, pp. 65-68.

⁴³ Eunice Ryan, "Reading for Gifted Children," *The Clearing House*, Vol. 31, January 1957, pp. 287-88.

⁴⁴ *Ibid.*, p. 288.

⁴⁵ Jewell F. Rudicil and Walter B. Barbe, "Reading Improvement Program for the Gifted," *SRA Guidance Newsletter*, March 1958, p. 4.

talented students who wished to take advantage of the special program for superior students. Because of the heavy demands upon the student's time in the more traditional academic subjects, the reading class had to be offered before school. Only those students in the "pilot group" who wanted to attend did so, and no record was kept of attendance; the only pressure to attend was the student's own desire to improve his reading. Classes were held for two sections, each meeting once a week. Reading rate of the students more than doubled while comprehension improved.

The results of all developmental reading programs for the gifted student at the secondary level have indicated clearly both the need for such a program and the high degree of success which can be expected even from minimal effort. Certain problems definitely exist. Perhaps the greatest problem is in finding a teacher with the necessary interest and training to teach reading. This problem is not insurmountable, however, and can often be resolved by transferring from the elementary level a teacher with dual certification to teach reading at the high school level. Recognizing that the problem exists is the necessary first step, and making some effort, either in the regular content classes or in special classes, must then follow. Assisting every teacher to understand his responsibility in the teaching of reading in his particular subject is essential. Special attention to reading in the English classes is probably a next step. The establishing of a developmental reading program, with specified time devoted to improving reading ability of all students, is the final step. From such a program will come better reading by all students.

STIMULATING BETTER READING AMONG THE GIFTED—UNFINISHED BUSINESS

More and more attention is given to teaching reading to all students. The importance of having the gifted child learn adequate reading skills cannot be overstated. But reading is more than just knowing how to read. Developing permanent interests in reading is of utmost importance.

Although gifted children have more interest in reading than do average children, they too need guidance in finding materials which will meet their needs. Paul Witty,⁴⁶ writing in the *Library Journal*, states this effectively: "Despite their wide reading, gifted children often need guidance in finding books to satisfy personal needs. In a world of television and comic books, they sometimes require encouragement, incentive, and direction to form desirable and individually appropriate reading patterns. Like other children,

⁴⁶ Paul Witty, "Enriching the Reading of the Gifted Child," *Library Journal*, Vol. 20, November 15, 1955, p. 2622.

the gifted need help in finding books to satisfy developmental needs as they arise."

To assume that the gifted student, merely because he is superior, will not need guidance in adjusting to the humdrum pattern of living in an average world is to fail to realize that because he is gifted, he will have more, not less, adjustments to make than the average child. Although the gifted student usually makes these adjustments in a satisfactory manner, one can only wonder how much better adjustment the gifted child might have made if he had been given the same amount of guidance given to other children.

The philosophy that every teacher is a teacher of reading has become widely accepted, but the belief in the importance of continuing reading instruction through the high school and even into college is not yet so widely accepted or practiced. Conant's clear delineation between remedial reading programs and developmental programs for the academically talented students should do much toward clearing up any misunderstanding.

Accepting the interests of gifted students, because their interests are more numerous and advanced than the average child's, is not enough. Teachers must accept the responsibility of enriching the program for gifted children so that they will develop new interests and broaden their present ones. The development of new interests is particularly important, for too often we believe that because the student is gifted this will provide him with enough different interests.

With all of the attention toward differentiating instruction for the gifted, caution must be observed to avoid making instruction so different that the gifted student resents never being allowed to do what the rest of the class is doing. Also, the rest of the students must not resent the enrichment activities provided only for the gifted student. Unit teaching provides the best opportunity to allow all students—gifted, average, and below average—to work together on the same topic, each learning those skills and obtaining that information which he is capable of absorbing, and benefiting from the efforts of the other students. On some occasions the instruction should not be so differentiated that the gifted student will feel apart from others, it should be planned in such a way that the gifted student works with all other students on the group lesson.

More attention still needs to be given to those advocating the individualized reading program as a method of teaching reading to all children and to the methods of beginning reading by use of the film-strip approach. Much more will be heard in the future about these methods, as well as about other successful programs in various school systems. Many suggestions for improving reading ability of children have been made and still more will be developed. The key to any successful reading program, however, will remain the classroom teacher. If he is a skilled teacher who un-

derstands individual differences and has the resources to provide a differentiated reading program, only then will reading instruction be effective.

SUMMARY

Long before the current increase in interest concerning the gifted child, Witty⁴⁷ stated that through the use of the library the gifted child would be expected to make much of his own curricular differentiation. This is still true today. Adequate library materials, both for pleasure reading and for obtaining information, are absolutely essential if we are to provide adequately for our gifted and talented youth. Much of the curricular differentiation, which the gifted need so badly, must be supplied through his own reading. Our responsibility is to be certain that the gifted student is a good reader so that he can make the necessary curricular differentiation.

In spite of the attention focused on other means of obtaining information, such as television and movies, reading will always remain the chief means of obtaining information. Only if we prepare our students so that they have the skills necessary to do the most effective job possible, can they truly enjoy both the process and the results of reading.

An examination of reading ability and giftedness shows many direct relationships between the two. Tests which purport to determine giftedness most often measure verbal ability, and verbal ability is a part of reading ability. That the gifted student is characterized as a good reader is accurate, but some gifted students are not reading well. The reading teacher's goal is not to push the gifted student's reading ability up to the level of his mental ability, but it is instead to develop within the gifted student the ability to read well with good comprehension. The final measure of how effective this program has been can be measured by how much the gifted student reads.

Implications of research on the gifted student and his reading reveal many unsolved problems. Because of the early age at which many gifted children learn to read, the question must be raised as to whether a rigid entrance age law is wise. The high interest in reading, early reading of adult books, and intensity of reading in a particular field all present problems to the classroom teacher who is already overburdened with large classes.

The best way to teach reading to the gifted student, at both the elementary and high school levels must be answered in terms of the conditions within each school. Examining the various programs operating in other schools may suggest ways in which reading can best be taught in your

⁴⁷ P. A. Witty and H. C. Lehman, "A Study of the Reading and Reading Interests of Gifted Children," *Journal of Genetic Psychology*, Vol. 40, June 1932, pp. 473-85.

school. Remember that administrative devices which provide for students are intended to make it possible for the teacher to do a better job.

Providing for our gifted students at all levels in all areas of academic work is still unfinished business. Reading will be the tool subject for most of the learning of gifted students. We must make sure that our gifted children and youth are being provided with the best possible reading skills and inculcated with a love of reading that will guarantee that their education will continue as long as there are good books to read.

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CHAPTER NINE

Foreign Languages

JAMES P. SOFFIETTI

At no time in the history of our country has the need been so imperative for intelligent leaders in all areas of endeavor who also know foreign languages and have an understanding of the culture, psychology, and aspirations of other peoples. Modern means of communication and transportation have not only made the world smaller as far as distances are concerned but also blurred, and in some cases eliminated, the lines between foreign and domestic policies. What goes on abroad is affecting more and more the economical, political, and emotional life of the people at home. The welfare of a nation is dependent increasingly on how well it gets along with its close and distant neighbors and on how efficiently it can communicate with them to create good will and develop mutual, international understanding.

Today more and more Americans are sensitive to these needs and feel that international understanding has become an issue of national importance. Some leaders in public education go so far as to pronounce the fostering of international understanding "a fundamental for American

schools" and the study of foreign languages one of the most important avenues for its development. We can no longer afford the aloofness and, in some ways, the arrogance involved in the let-'em-learn-English attitude. To have citizens proficient in the languages of other lands has become a national resource of great importance.

At the height of our need for trained personnel to help carry out our extensive foreign policies and activities, we find our resource of competent individuals limited to those who know only fragments of foreign languages. Despite this crucial need, the foreign-language offerings and enrollment in our schools are still at a dangerous all-time low. In the middle fifties, only about 15 per cent of our high school population was taking any kind of modern foreign language, and less than 50 per cent of our high schools were offering any modern foreign language. The poverty of foreign-language opportunities in the American schools became officially recognized as a serious problem of national concern when Russia launched the earth's first satellite. This event alerted the whole country to the urgent need for improving American education, strengthening our schools, and raising respect for learning.

The main question regarding foreign-language instruction is no longer whether it should be an area of the curriculum in the public schools, but (1) whether it should begin in the elementary grades, (2) how many years of it should be available on the high school level, (3) how it should be taught, and (4) who should study foreign languages.

The first question cannot yet be answered with a categorical statement. It is a fact, however, that an increasing number of schools are experimenting with foreign languages on the elementary school level and that even the Federal government has felt the need to sponsor institutes to train foreign-language teachers for the elementary grades. Within the next few years we should have an objective answer to this problem. The second question was aptly commented upon by Dr. James B. Conant when he stated that to limit the study of a foreign language to two years was like drilling for oil and stopping just before striking it. As to the third question, leaders in the field of foreign-language teaching are gradually accepting the view that the beginning language course started at any level should concentrate on the learner's *hearing and speaking* the foreign tongue, and offer opportunities for maintaining these skills in the advanced classes. The fourth question raises a series of important issues: Should all children enjoy the opportunity of acquiring a second language as part of their public education? Is language study hereafter so essential a part of American education, conceived as preparation for living in a world community (not to be confused with a world government), that some of it should be required of all students? Or should foreign languages be available only to those with above-average linguistic aptitude? Whatever answers may be given to this series

of questions, leaders in the field of education are now conceding a new and important role for foreign-language study. They agree that it should be an integral part of the curriculum for the gifted and for other children capable of profiting from such a program.

In the pages that follow, the reader will find a discussion on the significance of foreign-language study to the gifted child, suggestions for the enrichment of the foreign-language program, a summary of practices currently advocated in the teaching of foreign languages on the elementary and high school levels and pertinent comments on the training of foreign-language teachers for the gifted.

VALUES IN FOREIGN-LANGUAGE STUDY

An increasing number of foreign-language teachers are rapidly coming to the realization that the understanding of another culture should be the ultimate, over-all aim in their classes and that the language-learning activities should be planned and directed accordingly. This ultimate objective is known under a variety of labels including the development of international understanding, the concept of cultural relativity, cultural insight, and cultural empathy, that is to say, the ability to put oneself in "the other fellow's shoes."

To appreciate fully the possibilities of the foreign-language class in this respect, one should be aware of the following facts with regard to the nature of culture. (1) The various aspects of culture, that is, the economic, technological, political, social, and psychological activities that constitute the "way of life" of a people, are all delicately interlinked into a total structure. (2) Culture consists not only of overt, directly observable artifacts and activities, but also of attitudes, feelings, and other components that are often referred to as sentiments and beliefs. The sentiments and beliefs of any culture are also structurally organized and can be determined by inference through observation. (3) *The language system of a culture is its most important component not only because of the way in which it reflects and transmits the culture, but because it literally links and holds together its various aspects and their respective components. Every modern anthropologist knows that the full, correct understanding of a culture cannot be acquired without also knowing the language.*

Obviously then, the foreign-language class constitutes the *only situation in the curriculum* where the pupil may have an opportunity to learn *fully* about a specific foreign culture. Without having a relatively complete knowledge about another culture including its linguistic components, one cannot develop a correct concept about a third, a fourth, or even one's own. For only by comparing (consciously or unconsciously) the various

aspects of another culture, including its language and meanings, with our own, can we learn more objectively about our way of life.

The foreign-language class is also the only place in the curriculum where the pupil has an opportunity to go beyond the *learning about* stage and actually experience directly some of the systems of a foreign culture, specifically the language and those aspects of the fine arts involving language such as songs, drama, and literature. The foreign-language class also offers the only setting in which there is enough time for the process of linguistic and cultural comparison to take place *inductively*, by the natural approach, and to teach for transfer of training.

By spending enough time learning about another country's language and culture and comparing them with his own, the pupil will have an opportunity to build up a more meaningful terminology and a basic set of concepts necessary to learn about other cultures on an entirely vicarious basis and within the limited time the social studies teacher can allot to each one. To this extent we can speak of correlation and cooperation between the foreign-language class and the social studies class.

ENRICHMENT OF THE FOREIGN-LANGUAGE PROGRAM FOR THE GIFTED

Relatively little information has yet been published on foreign-language programs designed specifically for the gifted. Even less information is available on how to enrich a language class so as to challenge and interest these children of high intelligence. An investigation would also show that most special classes, stated as being geared to the gifted, differ from regular classes only in the fact that they are populated by bright children exclusively and that the linguistic subject-matter is covered more rapidly and extensively. In most cases the foreign-language program itself is not enriched, but rather the gifted child's total program is enriched by the addition of a course aimed at developing a certain degree of skill in the use of a foreign tongue.

More advantage should be taken of the fact that the gifted is practically the only person intellectually equipped to achieve, without sacrificing the purely linguistic objectives, a satisfactory degree of the valuable cultural insights mentioned in the preceding section. However, relatively little of these values will be achieved by the gifted in elementary and intermediate courses in which the main activity is that of teaching by the book. Extremely few texts, even among the most recent ones, deviate far enough from the traditional structure as to lend themselves to the teaching for the important cultural values mentioned above. This is not the fault of the publishers: textbooks are written and adopted by teachers! The objectives can

best be achieved by an enrichment program built in and around the modern conversational approach to foreign-language teaching especially in the beginning classes.

Probably the most comprehensive and detailed discussions as to means for enriching a learning program in foreign languages is found in Walter Kaulfers' *Modern Languages for Modern Schools*.¹ The following list of desirable outcomes and objectives should serve as a detailed guide and suggest to the foreign-language teacher, who wishes to enrich his class, the content and activities that will help meet the diversified needs of the gifted in either a heterogeneous or a special class situation. They have been compiled from the large number of *associate outcomes* that have been widely publicized by foreign-language committees and individual writers. Kaulfers divides them into categories remindful of the "Cardinal Principles of Education."²

A Associate outcomes contributive to the *worthy use of leisure* through such activity interests as the foreign-language program may develop in:

- 1 Travel, e.g.,
 - a. Enjoyment of books and magazines on foreign countries.
 - b. Enjoyment of lectures on travel.
 - c. Enjoyment of travel films.
 - d. Actual travel abroad.
- 2 Foreign literature, whether in the original or in translation, plays by foreign dramatists, and the like
- 3 Foreign-language study as a hobby or avocational pursuit
4. Foreign correspondence
5. Radio programs, songs, and operas broadcast in whole or in part in a foreign language; sound pictures and newsreels containing foreign dialogues, and the like.
6. Evidences of foreign culture in the immediate environment, e.g.,
 - a. Enjoyment of concerts, recitals, or exhibits by foreign musicians or artists.
 - b. Enjoyment of "fiesta" programs, fetes, and celebrations staged by local foreign colonies.
7. Participation in open forums, literary societies, international good-will organizations, foreign-correspondence clubs, travel clubs, or foreign-language study groups
8. Language as an art, i.e.,
 - a. A greater enjoyment of style and usage in speech and literature.
 - b. A greater interest in the psychology, history, or science of language.

B Associate outcomes contributive to increased *ability to understand, adjust to, and cooperatively improve the social environment*. These em-

¹ Walter V. Kaulfers, *Modern Languages for Modern Schools* (New York and London: McGraw-Hill Book Company, Inc., 1942).

² *Ibid.*, pp. 351-354.

brace such attitudes, appreciations, and insights as the foreign-language curriculum may develop through content and activities stressing:

1. A more sympathetic understanding and fairer treatment of fellow students and fellow citizens of foreign birth or descent.
2. The possibility of building a more creative and enlightened American way of life by integrating our human and cultural heritage from other nations and cultures—our heritage in people, customs, mores, religion, science, invention, arts, music, literature, architecture, philosophy, education, language, law, the dance, and the like.
3. Worthy ideals for the motivation of ethical conduct as revealed in the literature, philosophy, and customs of foreign peoples.
4. Openmindedness and tolerance in human relations, personal and international.
5. A realization of the essential oneness of human nature—of the fact that all people, not just ourselves, cherish the right to life, liberty, and the pursuit of happiness as conceived in terms of their philosophy of life.
6. Increased ability to *understand* instead of *depreciate* languages, standards of values, and customs that may be different from our own.
7. Increased ability to understand the causal relationships between the social and physical environment as they are revealed in the customs, standards of living, and vital statistics of foreign peoples, *e.g.*, the effects of climate on customs, diet, architecture, recreations, and so forth.
8. Increased ability to understand the significance of education, literacy, unity in language and cultural traditions, for individual and group welfare insofar as the influence of these factors is revealed in the life of a foreign people.

C. Associate outcomes contributive to increased *ability to understand, appreciate, adjust to, and improve the physical environment*. These embrace such knowledge, attitudes, and insights as the foreign-language curriculum may develop through content and activities stressing:

1. A greater appreciation of our material environment in terms of the contributions that foreign peoples have made through science and invention to the improvement of living conditions—to *personal and public health, to more efficient means of communication and transportation and to the increase in human comforts throughout the world*.
2. A greater insight into the causal relationships between the natural physical environment and the man-made material environment as reflected in the industries, systems of transportation and communication, economic influence, living and working conditions, and technological progress of foreign peoples.
3. A greater insight into the causal interrelationships between the physical, social, and political environments as revealed in the life of a foreign people.
4. Increased ability, through knowledge of the foreign language, to make ready use of foreign contributions in the field of science and invention.

D. Associate outcomes contributive to the building of *desirable physical and mental health*. These embrace such knowledge, attitudes, interests, and habits as the foreign-language curriculum may develop through content and activities stressing:

1. An appreciation of such wholesome traits of foreign people as have a bearing on emotional and physical health, and as deserve emphasis in our own daily life, *e.g.*,
 - a. Temperance and moderation in personal habits
 - b. Enjoyment of simple pleasures
 - c. Community encouragement of music, folk dancing, games, and other arts as popular recreation.
 - d. Unhurried attitude toward life
 - e. Appreciation of nonmaterial values.
 - f. Wholesome home and family life
2. An understanding and appreciation of the importance of the problems of sanitation and public health insofar as these manifest themselves in the life of a foreign people. For example, health problems in relation to climatic factors, levels of literacy, superstitions, organized health services, popular food habits, and the like.
3. Worthy attitudes toward the value of a sound mind in a healthy body insofar as they are reflected in the life of a foreign people.
4. Insights into the causal interrelationships between mental health, physical health, and social adjustment as portrayed in literature.

E. Associate outcomes contributive to increased *vocational and pre-vocational efficiency*. These embrace such knowledge, attitudes, interests, and appreciations as the foreign-language curriculum may develop through content and activities stressing:

1. Linguistic abilities required by vocations in which work with foreign languages is the major responsibility, *e.g.*,
 - a. Professional translation and interpretation.
 - b. Linguistic research; lexicography, and the like.
 - c. The teaching of foreign languages and literature
2. Linguistic abilities highly desirable in vocations involving frequent contacts with foreign languages, *e.g.*,
 - a. Foreign commerce
 - b. Foreign (news) correspondence
 - c. Foreign travel service
 - d. Foreign consular, diplomatic, and secret service.
 - e. Acting and directing as a background for character portrayal
 - f. Singing—concert, opera, radio, and the like
 - g. Scenario writing and adaptation of foreign literature
 - h. Scientific research and foreign expeditions—geographical, archaeological, geological
 - i. Foreign propaganda agencies, and the like.
 - j. Miscellaneous occupations, *e.g.*, service on board international steamship, railway, or airlines; social-service work in foreign quarters of American communities, clerking in stores located in foreign sections of American communities;

customs inspection; service in large metropolitan hotels; *occupational placement bureaus in certain localities*; teaching Americanization classes, children of foreign-born, English to foreigners, and so forth.

To provide for the content and activities necessary to develop some of these knowledges, attitudes, appreciations, interests, and insights is not an easy task, especially for the beginning teacher. Anyone undertaking such a program for the first time should, first of all, have a very clear picture in his mind of the general characteristics of gifted children and of the individual talented pupils in his particular class. An examination of even a few such characteristics will readily suggest to the enterprising teacher some of the activities and projects and sources of information that would help him provide for the diversified needs of the gifted.

With these awarenesses in mind, the teacher's main problem becomes one of *time*: time to prepare himself to read, to investigate, to see what others are doing, to discuss problems with other teachers concerned with the gifted; time and money to gather materials, to provide necessary audio-visual aids, to establish sources of information; time to prepare projects and units that integrate into his regular program; and, of course, time within his classes to teach for enrichment without sacrificing the equally important objective of developing the linguistic skills.

Obviously, an inexperienced teacher cannot start a full-blown program of special foreign-language classes on short notice. On the other hand, to begin by providing for the gifted in one's regular class is a comparatively practical approach once the teacher is aware of their individual interests. In a small school the enrichment program in the regular class is probably the only, and certainly the least controversial, system providing for the gifted.

TEACHING THE LANGUAGE SKILLS

Valuable cultural outcomes of an enriched program cannot be achieved without also developing an acceptable degree of competence to understand, speak, read, and write a foreign tongue.

Today we know much about the nature of language and how it can best be learned. We are becoming more and more conscious that language is basically a spoken, an audio-lingual phenomenon, a system of vocal habits, and that writing, on the other hand, though culturally extremely important is a relatively modern invention to record language by means of visible marks. We are finally also realizing that grammar (*i.e.*, the description of linguistic structure), important and helpful though it may be, is by no means indispensable to the learning of a language. Grammar does not lead

to the mastery of the foreign tongue. One does not learn to speak a language by talking about its structure; one learns to speak by speaking, by listening, by imitating and repeating sound patterns. The realization of these facts is gradually causing the traditional grammar-translation method of language teaching to be replaced by a conversational approach, especially in the beginning and even the intermediate courses. More and more teachers are reaching the conclusion that grammar should be taught "functionally," i.e., when it helps to convey meaning in written or oral assignments, and not "formally" as a step in a deductive approach to foreign-language teaching. Some leaders in the profession go so far as to advocate the relegation of formal grammar to courses beyond the intermediate stages on the high school level and even then as an activity reserved primarily for the gifted pupil.

The new conversational approach is especially valid in teaching the gifted since, in general, they are the ones who will have more opportunities and need to understand and use the spoken language. The main difference that one will notice in teaching the linguistic skills to the gifted can be traced directly to his specific characteristics. For instance, (1) his superior memory and longer span of concentration reduce considerably the time needed to learn dialogues and variations thereof for classroom dramatization. Superior memory and concentration also enable him to expand with greater facility his active and passive vocabulary and phraseology. (2) His unusual ability to reason inductively and deductively makes him practically the only pupil who can profit from grammatical explanations and take advantage of the short cuts they offer in the process of learning the foreign tongue. This also reduces his needs for explanations, repetitions, and reviews of the principles. (3) Being more flexible in his thinking, he is also less rigidly bound by the speech and writing patterns of his vernacular and readier to accept the logic of differences and variations. These factors alone should help us understand why the gifted not only require up to one third less drill work and explanation than the average pupil but also why they are capable of reaching advanced stages more rapidly.

FOREIGN LANGUAGES IN THE SENIOR HIGH SCHOOL

This and the following two sections will discuss the main features of methodology and techniques of teaching foreign languages to the gifted on the senior high school, elementary school and junior high school levels respectively. The main reason for not following a logical developmental sequence is the fact that the foreign-language program in the junior high school will depend entirely on what precedes or follows it.

In the Conant Report,² the following recommendations are made with regard to the teaching of foreign languages in the high school:

The school board should be ready to offer a third and fourth year of a foreign language, no matter how few students enroll. The guidance officers should urge the completion of a four-year sequence of one foreign language if the student demonstrates ability in handling foreign languages. On the other hand, students who have real difficulty handling the first year of a language should be advised against continuing with the subject (recommendation 13). The main purpose of studying a foreign language is to obtain something approaching a mastery of that language. And by a mastery is surely meant the ability to read the literature published in the language and, in the case of a modern language, to converse with considerable fluency with an inhabitant of the country in question.

In another section of the report, Dr. Conant strongly urges that the academically talented be *required* to take among other subjects four years of one foreign language and that those with unusual linguistic aptitude be given an opportunity in the twelfth grade to take a course as outlined in the *Advanced Placement Program* sponsored by the College Entrance Examination Board.

In the following pages, an outline is presented for a four-year program to begin in the ninth grade. The general outline and methods recommended are equally valid in principle, for the average and the gifted students. As suggested in the modern approach to foreign-language teaching, the main difference between a regular and a gifted class turns out to be one of the time necessary to learn the skill, not one of kind. This is especially true in the beginning and intermediate classes.

The First-year Foreign-language Course

In the first-year course, the cultural objectives should be stressed even at the risk of sacrificing certain traditional linguistic aims. The main reason for this is to make the first-year course a worthwhile experience even for those pupils who, for various reasons, will not take the second year.

Cultural objectives: (1) Progressive development of the concept of cultural relativity. (2) Greater understanding and respect for the way of life of other peoples. (3) Fuller and more objective understanding of our way of life including that of minority groups.

Linguistic objectives: (1) Acquisition of a basic set of speech patterns with adequate pronunciation and fluency. (2) Progressive ability to read orally from a graded reader with adequate pronunciation, fluency, and understanding. (3) Ability to write under dictation prepared materials.

² James B. Conant, *The American School Today* (New York: McGraw-Hill Book Company, Inc., 1959), p. 69.

Development of the Cultural Objectives

A careful study of the list of desirable outcomes and the enrichment activities they imply should also suggest to the alert teacher the kinds of materials needed to teach the stated cultural objectives. Such materials are available in the form of audio-visual aids: films, pictures, slides, records, songs, tape recordings, maps, and various periodicals and books published both here and in the country where the language is spoken. These materials can be obtained by writing to the various embassies, consular services, cultural bureaus, UNESCO, travel agencies, film libraries, and State Departments of Education. Lists of addresses are usually available in the appendices of recent books and monographs on methodology, as well as in the publications of the language associations.

An increasing amount of information is becoming available on specific methods and techniques of teaching for the cultural objectives.⁴ One should also not overlook, however, the practical suggestions that the social studies teacher might have to offer in this respect. As a matter of fact, certain projects and activities for the gifted could be planned and conducted in cooperation with the social studies instructor. In many ways the first-year foreign-language teacher is a social studies teacher who has specialized in the language, culture, and civilization of a particular country. Within such a frame of reference, he should be able to learn and apply many of the excellent techniques that have been developed in this area.

As far as presentation, the amount and kind of cultural material that can be introduced and discussed in the foreign tongue itself is limited, especially during the first year. This is especially true in a regular class. In a class of gifted children a great deal more of the foreign language can be used to present and discuss the cultural materials.

Development of the Linguistic Objectives

The first-year foreign-language program described below differs from the traditional one mainly in the fact that it does not call for the development of ability to translate from English into the foreign language. This means that during the first year teaching formal grammar and building an active vocabulary of words learned mostly in isolation are not necessary. It also implies that this course has no place for the traditional first-year, grammar-laden textbook. An adequate, graded reader should suffice as a text. The progressive development of ability to translate into the foreign lan-

⁴ *Education for International Understanding* (Washington, D.C.: The National Education Association of The United States, 1948). *Inter-American Education in Our Schools* (New York: Curriculum Service Bureau for International Studies, Inc., 1950).

guage should be relegated to the following years when the pupils who are not linguistically inclined will have dropped out.

Careful consideration of the activities involved in obtaining these objectives will reveal, however, that this is in no way a watered-down first-year course. Nor does it neglect preparation for College Boards, Regents, and similar examinations. If we look over a past sampling of this type of examination, we find that at least sixty-five per cent of the total score calls for ability to comprehend the written and spoken language and for the ability to write a few lines under dictation. Relatively few questions require skill in translating English into a foreign language. Thus, grammar can be taught functionally, that is, when required to understand stenciled materials and the pages of the graded reader. And most of the vocabulary will be learned in the context of basic conversations and conversational pattern practice exercises as well as in the context of the graded reader.

For success in accomplishing the objectives we have outlined, it is imperative that the first-year foreign-language teacher fully realize, and assume the corresponding attitude and frame of mind, *that he is not out to train translators of English into the foreign language, even in the case of gifted children.* With this precaution in mind, we can now briefly discuss the linguistic objectives.

Acquisition of a basic set of speech patterns with adequate pronunciation and fluency. Mastery of basic speech patterns can best be attained by memorizing dialogues by the mim-mem (mimic-memorization) approach and by learning how to dramatize them in typical settings that might be encountered in the foreign country. (Dramatization offers another opportunity to learn certain customs by doing.) To this extent, the linguistic activities also contribute to the development of cultural insight.

Mastery of a dialogue will mean: (1) ability to act it out before the class with naturalness and with acceptable pronunciation, intonation, and fluency; (2) ability to substitute in the dialogue certain simple particulars which will have been learned, drilled, and practiced under the guidance of the teacher.

The general objective may be considered as reached once the pupil has mastered over the forty weeks that make up the school year approximately twenty to twenty-five basic conversations, with variations, dealing with subjects ranging from talking about the weather to conducting a class in simple arithmetic or shopping for a souvenir.

Methodology, Activities, Techniques

The initial stage in the first-year high school class should consist of a period during which all the language work is done orally.³ It may well

³ Patricia O'Connor, *Modern Foreign Languages in The High School: Pre-reading Instruction* (Washington, D.C.: Government Printing Office, 1960).

correspond to the first official grading period. During this stage all textbooks should be withheld, and no writing should appear on the board. The dialogue should be *learned in class* by the mimie-memorization approach and varied by simple substitution- and expansion-type drills and practice. At least one small conversation a week can easily be learned to the point of acceptable dramatization in meaningful situations. (Homework should deal only with the attainment of the cultural objectives during this initial period.) Throughout this course, pronunciation, intonation, fluency, and comprehension should be the principal linguistic aims with quality above quantity in importance. Continuous stress should be placed on the importance of developing "good imitators." This may not be an easy task since it may involve efforts to overcome self-consciousness. During this first stage in particular, the teacher should avoid answering such questions as "Which word means 'how' or 'do' in the foreign-language expression for 'How do you do'?" The aim is not that of learning isolated words but that of acquiring whole utterances regardless of their morphological or syntactical composition. We must constantly keep in mind that the chief aim in a beginning course is to learn to understand and speak the language, and that the smallest learning unit in speech and comprehension is the whole utterance and not the isolated word. Mastery through meaningful overlearning should be the aim. In other words, the pupil should acquire the ability to make the response as mechanically as any other habit and without any conscious thought of how he is articulating. Of course, in the beginning the utterances should be relatively short.

The length of this no-book phase will vary from class to class. Sooner or later the law of *diminishing returns* will set in as far as learning by aural-oral imitation alone is concerned. At this point the pupil will be ready and eager to see in writing what he has been saying and memorizing orally. Stenciled copies of the conversations can serve as an introduction to reading. The next stage should be spent learning the rudiments or mechanics of reading, including an introduction to the first few pages of the graded reader.

At the end of this second period (again approximately, a six-week marking period), most pupils should be ready to continue learning new conversations by the mim-mem approach, supported by the written word. To save time and effort, the teacher will have each new conversation printed on a large chart. Once the children have learned to read it with correct pronunciation and with fluency, they should be given stenciled copies to take home and finish memorizing. In most cases, the gifted pupil will probably be able to memorize it outright, thus freeing homework time for other enrichment activities. As already stated, acceptable dramatization will be the proof of mastery. As the pupil will readily find out, learning to dramatize a foreign-language conversation has a great deal in common with

learning one's lines in a play. Practically the same techniques and psychology are involved. In general, children should not be encouraged to do "free conversations." If they are interested in conversing on a specific topic, the teacher can help them prepare such a conversation and have it stenciled. As the class progresses, the desire for free conversation increases, particularly in the special classes. In mixed classes, individual attention or a project approach is required to satisfy this need.

By the end of the year, the pupils should have learned enough language to be able to prepare, with the aid of the teacher, a short play for dramatization in the assembly program with the linguistically more talented pupils taking the major roles.

Progressive ability to read orally from a graded reader with adequate pronunciation, fluency, and understanding. Three reasons for stressing oral reading and not encouraging silent reading during the first year are: First of all, it is the only way to build up the correct mechanics needed to learn the conversations that will be handed out in stenciled form. Second, it is the best way to keep children from building up the habit of reading the foreign language *Englishly*. Third, it constitutes an additional avenue for the formation and reinforcement of speech patterns.

While reading, the need will arise for functional grammar and for the building up of a recognition vocabulary. Much of what is usually taught as formal grammar when learning to translate English into the foreign language can be taught as recognition vocabulary in our reading approach.

Ability to write prepared materials under dictation. Writing under dictation is one of the most effective activities for the development of linguistic skills. It promotes the development of skill in the perception of sound differences and in the grasping of meanings. The process involved in preparing for, taking, and correcting dictations can be one of the best means for learning a great deal of grammar inductively. As homework, children should be asked to prepare to write under dictation a few lines taken from a given short passage. The best way to prepare is to copy the assigned passage two or three times looking at and saying each word very carefully. Here again, of course, the gifted child will excel. For him, preparation for dictation will mean the acquisition of additional active vocabulary, the formation of new grammatical concepts, and the reinforcement of those already met in previous reading and conversation assignments.

Toward the end of the school year, most pupils should have acquired enough familiarity with the language and enough sight vocabulary to be ready to develop in class and under guidance some of the most common synoptic tables that are usually found in review grammars. This activity will give the teacher an opportunity to develop some of the principal grammatical concepts and terminology that all foreign-language pupils should know. In this connection, some "open notebook" translations of very simple

English sentences into the foreign language might also be advisable. These activities will constitute an additional aid for the teacher in determining which pupils should be advised not to continue the foreign language in the second year.

In the case of the gifted, the readiness mentioned above will come much earlier, thus freeing more time for various forms of enrichment or, in the special classes, for further progress in the acquisition of the linguistic skills.

Not all teaching situations will lend themselves readily to the pattern of instruction outlined above. Should it be necessary for a number of reasons to use the traditional first-year textbook, one should be chosen in which the lessons are built around a central conversation. If such a choice is impossible, we suggest, as an alternative, that the teacher make a list of the vocabulary, phrases, and sentences contained in the lessons usually covered during the first few weeks and adapt them (not force them) into a series of conversations. But whatever the textbook, every effort should be made to begin the course with a reasonably long period of strictly aural-oral work.

Second-year Foreign-language Course

Here again, the objectives stated below are valid for both the regular and special classes. In the case of the gifted, a greater degree of achievement in both the linguistic and cultural aims should be expected and thus, more time should be available for special projects and activities.

Cultural Objectives: The ultimate objectives are the same as those of the first-year course. More stress is placed on the historical aspects and on the influence of the given culture on our own and that of other countries. The class should be kept up to date with regard to important contemporary events. Much of the cultural information will come from outside readings in English followed by discussions in class. However, an increasing number of these activities will be done in the foreign tongue, especially toward the end of the course. The foreign-language club will also lend itself to the development of certain cultural objectives.

Linguistic Objectives: (1) *Conversation:* Further dramatizations of common life situations. Development of ability to ask, understand, and answer questions. Gradual development of ability to do free conversations on selected topics.

(2) *Reading:* Greater stress on silent reading in more advanced graded readers. Reading for content. Translation into fluent English. Use of reader to develop conversation objective.

(3) *Dictation:* Same as first year followed by gradual introduction of unprepared material.

(4) *Vocabulary*: Development of a basic active vocabulary mainly through the conversation, reading, and translation activities.

(5) *Grammar*: Formal grammar necessary to develop progressive ability to translate into the foreign language. Children will have acquired enough skill to understand the written language and will be *ready to learn by a truly inductive approach* the essentials of formal grammar needed to translate simple sentences and passages into the foreign language and pass, for example, second-year College Board or Regents examinations. During the early stages, the pupils will be asked to translate back into the foreign language English translations of familiar passages taken from the reader. A carefully chosen College Board or Regents review-type book may well serve as a reference grammar to supplement the graded reader, especially after the first semester.

The Third- and Fourth-year Foreign-language Courses

In general, the third- and fourth-year courses should be reserved exclusively for the gifted and for pupils with unusual linguistic aptitude. The fourth year should be an advanced course built around a program as outlined by the College Entrance Examination Board; preparation for such a course should begin in the third-year class. This is what the Advanced Placement Program Syllabus⁶ states, for instance, with regard to French and the content of such a course:

"The objectives recommended for an advanced course in French in the secondary school are knowledge of the language and knowledge of the literature and culture.

"Knowledge of the language should include the following abilities: to understand what an educated native French speaker says when he is speaking at normal speed on a subject not unduly specialized; to speak with an acceptable pronunciation and with a command of vocabulary and syntax sufficient for sustained conversation on a general subject; to write clearly and with correctness in vocabulary, idiom, and syntax, and to compose an informal but well-ordered narration, description, or essay; and to read and comprehend at sight prose and verse of moderate difficulty and mature content and, with the aid of dictionaries and reference books, to comprehend any material within the range of the student's general knowledge.

"Knowledge of the literature and culture involves an acquaintance with representative works significant for their content and literary values and the ability to read with understanding and appreciation. The student should be able to comprehend the situations, emotions, ideas, and implications of works which might be read in a college course in literature and to relate

⁶ Advanced Placement Program Syllabus (New York: College Entrance Examination Board, 1958), pp. 58-59.

such works to their historical and cultural setting. In doing so, he should be aware of the distinctive contributions of France to Western civilization and of the principal resemblances and differences between French patterns of life and thought and our own.

"It is recommended that able students who have done outstanding work for three years in the secondary school, as well as those who by other means have reached a comparable level of achievement, be considered for an advanced course of study in their senior year. The advanced course will be more effective if students can be selected on a preliminary basis in the second and third year and given guidance in special work at this early stage.

"In planning the advanced course, the secondary school teacher must have some freedom in selecting objectives and be encouraged to utilize his individual resources, talents, and imagination."

The Advanced Placement Program Syllabus goes on to describe in considerable detail the type of examination that the student will have to pass to be admitted with sophomore standing in French or to be excused from taking any additional foreign language in colleges which have made such an agreement. Students passing the advanced placement examinations will have demonstrated unusual linguistic talent and should be encouraged to continue the foreign language in college at least as a minor subject of concentration.

Little needs to be added to suggest the content of the third- and fourth-year high school course for the gifted except that such a program should be a challenge to both the students and the teacher.

FOREIGN LANGUAGES IN THE ELEMENTARY SCHOOL (FLES)

While the value and feasibility of a FLES program for all children is and will remain for some time a moot question in the minds of school people, there is little doubt or at least resistance to the idea of including foreign languages in the elementary programs as enrichment for gifted children.⁷ This is not meant to imply that only the gifted can learn a foreign language. Supervisors and teachers of long-established programs have often found children who were comparatively slow learners in other areas of the curriculum to be outstanding in learning to *speak* a foreign language. The main objections are of two kinds: one raises the question

⁷ Modern Language Association. *MLA Teacher's Guide; Beginning French in Grade Three; French in Grade Four; German in Grade Three, Spanish in Grade Four; Spanish in Grade Five* (Darien, Conn.: The Educational Publishing Corporation, 1958).

as to whether the value of such a program is so great as to justify replacing some other activity in what is already a very crowded program. The other problem is an administrative one and constitutes a more immediate and real obstacle; it raises the question of lack of funds, scarcity of adequately prepared teachers, and crowded classrooms. However, when thinking in terms of foreign languages for the gifted only, most of these problems are reduced proportionately.

The ultimate, fundamental objectives of a foreign-language program for the gifted are practically the same throughout the grades, from kindergarten to the twelfth grade. For the elementary grade program they are as follows:

Cultural objectives: Progressive development of concepts and attitudes leading to greater understanding and respect for the way of life of other peoples.

Linguistic objectives: Progressive development of the ability to understand and speak the language and eventually, in the case of the gifted alone, to read and write it. Development of native or near-native pronunciation and fluency.

The degree in which these objectives can be obtained by the time the child has reached the end of the sixth grade will depend on a number of factors: the qualifications and ability of the teacher; the grade at which the foreign language is begun; the length and frequency of the classes in the various grades; the teaching method and techniques employed; the equipment, materials, and space at the teacher's disposition; and the size and composition of the class. Obviously, in a class composed exclusively of gifted children, the progress and results will be much greater.

When to Begin Formal Instruction

Observation and research indicate that the years from five to approximately twelve are the best for children to learn to understand and speak a foreign language. Therefore, the sooner one begins the better. Although several established and experimental programs begin in the first grade, the fourth grade seems to be the most popular. It is also a good level to begin when introducing a foreign-language program for the first time. First, a program beginning at the fourth grade and limited to the gifted raises a minimum amount of the administrative problems mentioned. Second, by this time the gifted pupil will have developed some basic understandings in the social studies areas which will make him better prepared to read and discuss the culture of the language being studied.

Number and Length of Weekly Sessions

Learning theories have proved that frequent short periods for certain content material similar to foreign languages are more effective than longer

sessions at more widely spaced intervals. Fifteen- to twenty-minute periods daily are strongly recommended, especially in regular classes of average pupils in the first three grades where the main objective is that of learning the linguistic skill as the cultural objective is a concomitant outcome. In the case of the gifted, however, it is strongly recommended that the classes be at least forty-five minutes long and meet three and preferably five times per week. This enables the alert teacher to integrate the learning of the skill with that of the culture and to have time enough for discussions, reports, and the use of modern audio-visual aids. In other words, the program for the gifted should have, when possible, some of the features of a language-and-area-study program.

Continuity Through the Grades

The problem of providing for continuity and progression of instruction through the grades can be a serious one when the teaching is done by the homeroom teacher. Practically no instructional problem exists, however, when it is done by a FLES specialist with a foreign-language room at his disposition.

The availability of a foreign-language room to which the children go at assigned hours is extremely important in order to obtain the best results from the point of view of instruction and administration. It also permits grouping of grades in one classroom, thus reducing the cost of the program. The class size should not exceed twenty pupils, however.

Methods, Materials, and Techniques

A number of factors will influence to a considerable degree the methods, techniques, and even the materials that will be used in teaching a foreign language on the elementary school level. One important variable is the teacher himself. Aside from his academic and professional qualifications, whether he is the homeroom teacher or a visiting specialist, who, like the art or music teacher, might have up to two or even three hundred pupils makes a considerable difference. The specialist, who steps into a class twenty minutes a day, certainly will not have enough time to make efficient use of audio-visual aids to develop fully the cultural objectives or to use the discussion and project approach in his teaching. He is pretty much limited to teaching for the linguistic objectives by a mim-mem, singing, and dramatization approach.

Other important factors that influence the general methodology and specific techniques have to do with such things as how soon reading and writing are introduced, if at all; the grade at which the language is introduced; the number, length, and size of the classes; and whether the teaching will be done in a special classroom.

Whatever the factors that might influence the conditions under which the foreign language will be taught, the one invariable feature will be the fact that the language skill will be taught by a strict audio-lingual approach through the sixth grade as is done in one outstanding program for the gifted, the so-called Major Work Class Program in the Cleveland, Ohio, public schools. In this program, classes in the foreign languages begin in the first grade, and are taught for forty-five minutes each day by special teachers.

Note that in the Cleveland plan no reading and writing is introduced in the first six grades: the method used is exclusively audio-lingual. This is done in order to take full advantage of what DeSauzé, the originator of the plan, calls the "bilingual or multilingual" period, which extends approximately up to the age of twelve. This is the age in which a child learns a foreign language empirically, mostly by imitation and without analysis or comparison with his own mother tongue.

The exclusion of reading and writing throughout the elementary grades is not necessarily the most advisable plan. However, as a general rule, this second phase of language learning should be postponed until the pupils have mastered the basic mechanics of reading and writing English and have become ready for vicarious learning through the printed page. But regardless of how early this readiness develops in the gifted, at least one year of strict audio-lingual approach is desirable for them. In other words, as much time as possible should be dedicated to the spoken language exclusively and to the development of the cultural insight that comes through the direct experiences of learning the language, using it in dramatizations, and singing the songs and playing the games that are sung and played by children of a similar age in the country whose tongue is being studied. This aural-oral period should also be used to set the stage for the more vicarious learnings of the following grades by acquainting the children with the country and the people through pictures, slides, films, and other audio-visual aids and through discussions. In the subsequent grades the ability to understand, speak, read, and write the language should increase progressively, and the cultural insight should be acquired on a more vicarious basis through reading, discussions, and research projects similar to those that a gifted child would do in a social studies, English, or fine arts class.

The FLES Teacher

Obviously from what has been said so far, the FLES teacher ideally should be a person who not only has specialized in a given language and culture but also is thoroughly prepared in elementary school methods, child growth and development and is aware and interested in the intellectual

and emotional characteristics of the gifted. The ideal FLES teacher may have prepared specifically for a FLES position or may be a qualified elementary school teacher who is fluent in the foreign language. Or, the specialist may be a secondary school language teacher who has qualified for elementary school teaching through an intensive teacher-training program. But regardless of who is going to teach the language, a major qualification is that of having an acceptable command of the spoken language.

FOREIGN LANGUAGES IN THE JUNIOR HIGH SCHOOL

Gifted children who have begun a foreign language in the grades should have an opportunity to continue it without interruption through the junior and senior high school even if this has to be done at a reduced number of hours weekly. An interruption at the seventh or eighth grade causes a wasteful setback in the already acquired fluency or a near complete loss if the child switches to another language or drops its study completely. This does not mean that the time spent in the foreign-language class will have been wasted. Most of the general cultural values, the concepts, and the attitudes that develop from such an experience should certainly remain. As a matter of fact, even the linguistic skill itself will not actually be lost if we consider that in most cases it would be relearned in a fraction of the time required to learn it originally.

Just what will be done in the first year of junior high school will depend principally on the accomplishments in the elementary grades. The main difficulty is to find or prepare adequate teaching materials. A great deal of study and experimentation is now in progress at this level, but a few more years are needed before suitable readers and sets of adequate teaching materials will be ready on a commercial basis. Syllabi prepared in current programs will have to serve as temporary guides. But whatever one does, one should avoid, if at all possible, the introduction of the traditional first-year textbook. The alert teacher should also be able to find some guidance among the suggestions that were made above for the first year of high school teaching.

On the other hand, a foreign-language program beginning in the seventh or eighth grade will hardly differ from the one we have described for the senior high school. To maintain continuity through grade twelve without taking up too much of the pupil's time, the course could be taught five days a week in grades seven, eight, and nine and only two or three days weekly in grades ten, eleven, and twelve. Of course, an advanced placement program in the twelfth grade would probably have to meet five days per week in order to achieve the required preparation.

THE FOREIGN-LANGUAGE LABORATORY

The foreign-language laboratory^{*} is becoming as integral a part of the language curriculum as the chemistry laboratory is in the science curriculum. If speaking and understanding are the primary linguistic objectives, especially in the beginning and intermediate classes, the need for mechanical aids to provide a large number of opportunities to hear the language and to imitate it repeatedly becomes obvious.

But before discussing some of the advantages and uses of the language laboratory, let us first see what is meant by this term. Broadly defined, it is an installation of mechanical and electronic equipment to facilitate language learning. One may distinguish between two basic types of such installations: The simplest type is for listening and repeating of prerecorded materials. It may consist of a tape recorder or a disc player with a number of headsets wired in parallel. This type of installation is usually built into the regular classroom by replacing the conventional desks with rows of tables wired with boxes with individual volume controls to which are attached the headsets. These are connected to the tape recorder or disc player placed on a table in the front of the room and usually operated by the teacher. Enough space is left between each box to enable the teacher to carry on the traditional classroom work. This type of installation is relatively inexpensive to maintain and will meet most of the needs of the modern foreign-language class.

A more elaborate laboratory is the listening-recording-playback-type of installation. Here the student can record what he hears, impress his imitations on a disc or a tape, and then play back his recording. Thus, he hears himself as others hear him, and he is able to compare his speech with the model that precedes his imitation. This type of laboratory usually consists of individual, semi-soundproof booths located in a special room. The cost of installation and maintenance is relatively high.

The superiority of the more complete type of laboratory is quite obvious from the point of view of facilitating the learning process. However it also has two other important advantages which apply specifically to teaching linguistically talented pupils. First of all, students can work at their own pace during and after class if necessary, thus taking care of their individual differences. In the second place, the complete laboratory permits advanced courses in schools where registration does not justify the offering of a conventional class. Third, it provides a means for instruction in languages not commonly offered, or for which there is no budgetary provision.

The teaching advantages of using prerecorded materials in a laboratory

^{*} Marjorie C. Johnston and Catherine C. Seeley, *Foreign Language Laboratories in Schools and Colleges* (Washington, D.C.: Government Printing Office, 1958).

SELECTION OF LANGUAGE

Theoretically, which modern language is studied by the gifted does not matter even in the elementary school. From a practical point of view, however, making a choice is not a simple matter. One criterion is to choose the language of an important nation with a literature worth knowing. Another criterion is selection on the basis of the number of native speakers. The choice would then have to be made from the following languages in the given order: Chinese (Mandarin), Hindustani, Russian, Spanish, German, Japanese, French, Malay, Bengali, Arabic, Portuguese, Italian, and so forth.

A third criterion, often suggested, is to choose the language of a large, local minority group. This touches the heart of one of our major cultural aims, that of developing a greater understanding of our minority groups. Obviously, it is also an excellent approach to the development of the ultimate cultural objective—international understanding. Such a choice also has the benefit of numerous resources and many direct experiences beyond that of the language itself. From a sociological point of view, the whole community benefits from such a choice. No doubt the study of a local minority group has been done as a social studies project. But the results certainly cannot be compared with the insights that could be achieved by a group of gifted children who were also studying the language, culture, and civilization of the land of origin of the minority under consideration.

Some educators believe that the time is soon coming when cultured Americans will feel the need to know one "common" and one "uncommon" foreign language, the first learned in public school and the second in college. Children with unusual linguistic talent should certainly be encouraged to begin a second foreign language on the high school level and probably a third one in college. If they are considering undergraduate work in science, they would be well advised to begin their foreign-language work in either German or French and to include, if possible, Russian as a second language.

Latin

A growing belief in foreign-language teaching is that, contrary to present practice, the modern language should be studied before an ancient one such as Latin, Greek, or Hebrew. There are at least two logical reasons for this. The first is the accepted fact that the best time to learn to speak a language is before the age of twelve. The second and equally important reason stems from the fact that Latin is usually taught, and rightly so, by the grammar-translation method, an analytical approach with little or no oral work. Thus a student having studied Latin first becomes so accustomed

to the analytical approach to language study and learning that in many cases he has difficulty adapting himself to the processes and activities involved in the conversational approaches to modern foreign-language teaching and learning.

Also generally accepted is that only the linguistically gifted should be advised to include Latin in their program and that Latin should supplement at least three years of a modern foreign language. Latin should probably be begun in the tenth grade. In addition to the traditional aims, a Latin course should also develop a considerable degree of insight into the historical nature of language and culture.

General Language

There is no place in the program for a "general" or "exploratory" language course if this means a semester or one-year course on the elementary or junior high school level in which pupils are exposed for a month or two to four or five different languages. Whatever value such a course may have can easily be incorporated as an enrichment activity in a regular foreign-language course or in a social studies program for the gifted.

Language Self-taught

One of the outcomes of studying a foreign language should be that of making it easier to study a second foreign tongue. The gifted who are linguistically talented are practically the only ones who could do so on their own with comparatively little guidance on the part of the teacher. Latin lends itself quite well to the self-teaching approach because it is usually not spoken but is taught by the grammar translation approach. In the case of the modern languages such an approach is greatly facilitated by the availability of a listen-record-playback type of laboratory

THE TEACHER OF THE GIFTED IN FOREIGN LANGUAGES

Regardless of which language is taught and at which level, the most important factor in a program for the gifted is the teacher. In this respect children do better to study a little known language under the guidance of a well-qualified teacher than to undertake the study of the most popular tongue in the class of a traditional teacher. In addition to the usual teaching talents, the teacher should have an expressed talent in foreign languages.

From the point of view of academic preparation, the teacher of the gifted should meet or strive to meet the *superior* qualifications (as opposed

to the *minimal* and *good*) set up by the leaders in the language-teaching profession, which were published in 1955 by the Modern Language Association.¹⁰ This official statement has been extensively distributed and is gradually being adopted by practicing teachers and teacher-training institutions. It should also be accepted by school administrators and guidance people. This statement calls for near native ability to understand, speak, read, and write a foreign tongue. The superior teacher also must have: "An enlightened understanding of the foreign people and their culture, achieved through personal contact, preferably by travel and residence abroad; through study of systematic descriptions of the foreign culture; and through study of literature and the arts."¹¹ Such a teacher should also have enough understanding of the modern techniques of language analysis and of historical linguistics as to be able to apply them to the language-teaching situation. From the point of view of professional preparation, he should have, "A mastery of recognized teaching methods, and ability to experiment with and evaluate new methods and techniques."¹²

The introduction of the foreign-language laboratory and the use of native models on prerecorded materials will greatly reduce the need to insist on near-perfect pronunciation and intonation on the part of the teacher. But their use will not lower in any way the need for the other qualifications mentioned in this section with respect to the teaching of foreign languages to the gifted on the public school level.

SUMMARY

Knowledge of foreign languages is a necessity if we are to develop better world relationships. First and foremost the way to understand our world neighbors is through their language system, which reflects and integrates the various component elements of their culture.

In the teaching of foreign languages, the audio-lingual system applied during the early years is the most advisable and it has definitely replaced the traditional grammar-translation approach. Comprehension and verbalization are the basic aims to achieve real understanding of a foreign tongue. Grammar should be functional and taught only when needed to understand the oral and written language.

Learning a language should be started early in life. Although most foreign-language programs today start at the fourth-grade level as a matter

¹⁰ Steering Committee of The Foreign Language Program of The Modern Language Association of America, "Qualifications for Secondary School Teachers of Modern Foreign Languages," *National Association of Secondary-School Principals*, Vol. 39, November 1955, pp. 1-4.

¹¹ *Ibid.*, p. 3.

¹² *Ibid.*, p. 3.

of expediency, observation and research show that the optimum years for introducing a foreign language are from ages five to twelve. Obviously, the kindergarten level is the best place to initiate a program. Before starting a program, continuity is a requisite with cultural and linguistic objectives interwoven throughout the elementary and secondary school.

The problem of which language to teach can be resolved according to three criteria: (1) importance of the nation; (2) the number of native speakers; and (3) a large, local minority group. To secure maximum learning, frequent short periods are recommended. However, the length of the period should vary with the age of the child. Irrespective of numerous aids to instruction, most prominent being the foreign language-laboratory, a teacher who has cultural empathy and an understanding of modern techniques of language analysis is essential for an effective program.

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CHAPTER TEN

Creative Art

W. LAMBERT BRITTAIN

In planning a curriculum for intellectually gifted children, one area that needs special consideration is art. Art is a rather elusive term, and maybe we should not try to give it a narrow definition. For some of us, art encompasses a wide range of experiences: it may be planning and building, it may be a compulsion for expression, it may be the beauty of our environment; but for others art is only something that hangs on the walls of galleries. Whatever feelings we, as adults, have built up about the field of art, these are the feelings we tend to pass on to those whom we teach. Drawing and painting have long held a prominent place in the adult world; but for children art is a great deal more than that. It is a natural and constant form of expression.

Although the materials and purposes may differ for adults and children, art is always with us and around us. Both adults and children use art as a means of expressing feelings about the world as they know it or might wish it, both use art as a means of changing or remaking their environment, both use art as a

means of communicating their deepest feelings. Working with potter's clay, inventing and creating new forms with this pliable three-dimensional material, is an art which has been with us since the beginning of civilization. This is not much different from children making forms from mud. Certainly drawing with fine charcoal on imported paper is not much removed from drawing with chalk on the sidewalk or with a stick in the sand. The putting together of bits of colored paper into a collage or pieces of colored glass into a mosaic is quite akin to the selection of leaves, twigs, and stones by a child walking through the woods; all could undoubtedly be described as art. The organization of visual form on the adult level—including architecture, industrial design, commercial art, and painting—plays a vital part in our society. On a child's level the organization of visual form also plays a vital role; this includes such activities as building with blocks, carving plaster, making whiskers on pretty magazine ladies, and experimenting with paint at the nursery school easel. The urge to express oneself in visual and plastic form is both natural and timeless and not restricted to any age level.

When is art not art? With such a broad definition, it may seem strange to say that certain activities masquerade under the guise of art which are not art at all. These include certain manipulation of materials which are not chosen, selected, or guided by the desires and needs of an individual: paint-by-the-number kits, coloring books, pre-stamped wallet projects, or those numerous step-by-step, how-to-do-it, preplanned, "all you have to do is follow directions" projects which appear in certain women's periodicals, some children's magazines, or hobby journals. These do not involve the individual in an exploration of his environment, nor in a redefinition of form, nor in an expression of the self. Instead, they demand a mechanical following-out of someone else's plans. This requires a certain conformity and denial of the self. One's initiative or will to change or remake his environment is thus thwarted. This is the opposite of art.

On the elementary level such an art masquerade may be a teacher-planned and teacher-executed "plaster hand" for Mother's Day, in which the only requirement for the child is to hold still long enough for the plaster to set. Or it may be a May Basket to which the teacher desperately tries to apply production methods, whereby thirty May Baskets are completed in the shortest time and most efficient manner. The objective is for the child to make a basket most nearly like the teacher's example. These and other projects which stress conformity and frown on individuality are merely exercises. They are not art, nor should they be a part of the curriculum. In such an art masquerade program, the slow learners and those not well coordinated become frustrated; the gifted, who should be given opportunities to find new methods and to work out their own solutions, are held back and penalized for finding the May Basket form in the folded paper and for

cutting a step or two ahead before the rest of the class is ready. In the area of art, the opportunity to create freely should rank highest. Yet a gifted child who is given only the incentive to conform may well become bored and turn to daydreaming or to the healthier but less acceptable outlet of causing a disturbance.

THE VALUE OF AN ART EXPERIENCE

The value of art for an individual has long been recognized, but particular points need emphasis when we speak of the intellectually gifted. Drawing or painting or making forms from three-dimensional materials is essentially a self-confrontation of ideas. That is, a child creates not from a void or from a magical "creative source," but from his own experiences and needs. The shapes, colors, and subject-matter he selects come from himself and are expressed as a work of art. A painting by an eight-year-old, for example, will have as subject-matter objects which have meaning to him, his house, himself and his friends, how he feels at night, the bumpy sidewalk in front of his house, how he would be if he were twenty feet tall, or how he would feel if he were angry red paint. In other words, the choice of subject-matter is an expression of conscious intent.

The colors he uses will have meaning to the subject-matter although with a younger child the paint will be more subconsciously selected; in some cases the color will be selected in spite of the fact that it bears no visual relationship to the object. If he likes yellow, the sky may be yellow; or the sky may be red because that paint is a thicker consistency. Even the location of the paint at the easel has some effect upon color choice.¹

As each child is different, so will the pictures of each be different. An eight-year-old may show a consistency of shapes or an attention to a particular area of his picture, or an attention to detail, or an omission or exaggeration of certain parts. These out-of-proportion forms often reflect a definite intention; for instance, a large object is usually more important. Sometimes these things are unconscious and may express deeper feelings or needs. The painting, then, is a record of a child's perceptual, mental, and emotional experience at the time he painted; and the gathering together, objectifying, and confronting himself with an experience which he portrays is one of the great educational values of art. Here is an exchange of ideas with the self.

Another important value of art for all children, but especially for the gifted, is the awareness it develops of the senses as an important tool in the learning process. We learn through our senses—sight, smell, sound,

¹ Ambrose L. Corcoran, "Color Usage in Nursery School Painting," *Child Development*, Vol. 25, June 1954, pp. 107-113.

touch, and taste—and yet our school systems do little to actively stimulate the senses. Within the arts, however, the senses play an important part. How an object looks, not just appears on the surface, can be an exciting topic for a fourteen-year-old. A painting of an old bottle from the top, side, or bottom, looking through it, and seeing reflections can be a stimulating and challenging experience. Younger children perceive in ways different from adults, and in some instances the sense of sight may be less important than the sense of touch. One theory holds that, for some people, sight continues to remain subordinate to the other senses as a means of becoming acquainted with the environment.² The sharpening of the senses—stressing how something feels, how it smells, how it tastes, the noise it makes, and how it looks, as perceived by the child—will help in stimulating an awareness of and a positive relationship with the environment.

The value of art from a therapeutic standpoint is well documented elsewhere.³ The gifted child, who may be frustrated by the slow learners in a reading class, or by the inability of his hands to do tasks which his intellect directs, or who is full of anticipation and emotion from a vivid experience, should be freely given the opportunity to put his feelings of joy or frustration into a form which is socially acceptable. For the child who tends to be less communicative or somewhat withdrawn, working in art materials should be actively encouraged.

With young children, the world of dreams, make-believe, and fantasy can be a very real one. Often older children, too, find refuge in the make-believe. "I'd show him if only I were bigger than he is," or "Wait until I grow up, then you'll see," or, "I'm the most beautiful princess in all the world, and my dolls are all my slaves." Adults find this make-believe somewhat hard to take at times; certainly in school the attitude is that this is no place for day-dreaming, for in school one is expected to tend to business and stop looking out the window. However, the other side of the coin shows that in man's dreams and fantasies is the finger that probes into the future.

Dreams, fantasy, and make-believe can become a very real part of thinking and learning if they are objectified. If they are continually left as a stored-up and forbidden area of the subconscious, they may serve only as a hidden refuge. In rare cases this world of make-believe may become more satisfying than the real world, with resulting mental complications. It is a rewarding experience to see children paint their fears, to draw their spookiest dream, to picture themselves stronger and taller than anybody, to paint the school being bombed, to model a princess from clay with a

² Viktor Lowenfeld, *Creative and Mental Growth*, 3rd Ed. (New York: Macmillan Company, 1957), p. 262.

³ Lauretta Bender, *Child Psychiatric Techniques* (Springfield, Illinois: Charles C. Thomas, 1952), and Emery I. Gonder, *Art and Play Therapy* (Garden City, New York: Doubleday, 1954).

large crown and cape, to make a paper mask with long fangs and green hair, to be lions and tigers in large painted paper bags. These activities encourage children to put fantasy into a concrete form where it can be looked at and appreciated.

Making an art experience from dreams, make-believe, and fantasy is a pleasurable exercise, a clarification and identification with one's own thoughts. For the intellectually gifted, it is more than that, for it encourages those who are best qualified to delve into the unknown, to probe the unusual, and to find satisfaction and pleasure in exploring areas where the directions and answers are found only in the self.

ART PERFORMANCE AND INTELLIGENCE

Do intellectually superior children perform better in art? Tests which measure intelligence, as we think of them in general terms, have no predictive value in selecting people with art ability. Intelligence tests tend to ignore those factors which are related to art. Standard tests of intelligence rate the verbal and numerical abilities highly. Since art may be thought of as being nonverbal expression, a type of intelligence relating to art abilities may exist which is not measured by existing intelligence tests.

However, intelligence and drawings of children have a positive relation until the age of ten.⁴ Goodenough⁵ devised a scale, based on children's drawings, for testing intelligence. Lowenfeld⁶ devised a scale, based on children's drawings, showing growth in several areas: intellectual, social, emotional, physical, perceptual, aesthetic, and creative. He based his scale on the relations of the child's development in drawing with his chronological age. The drawings of gifted children tend to show that these children, in their development of concepts, advance to a level equal to their mental age. Thus, the gifted child scribbles earlier than normal. The appearance of a definite, consistent form concept or schema normally occurs between seven and nine, whereas in the gifted child this development may well happen in the five-to-seven year age range.

In a secondary school art class, the characteristics of the intellectually superior appear different from those of average students. High or low intellectual capacity bears no relation to the aesthetic quality of the products of these students, however, these same students are characterized by differences in behavior. Harry Breen reports five characteristics which he has

⁴ Robert Burkhart, "The Relation of Intelligence to Art Ability," *Journal of Aesthetics and Art Criticism*, Vol. 17, December 1958, pp. 230-241.

⁵ Florence Goodenough, *Measurement of Intelligence by Drawings* (New York: World Book Company, 1926).

⁶ Viktor Lowenfeld, *Creative and Mental Growth*, p. 69 ff.

observed while working in art with students who are intellectually superior:[†]

1. The intellectually superior student is capable of a greater depth of understanding than the average student;
2. The intellectually superior student is more sensitive than the average student;
3. The intellectually superior student has a better imagination—a greater fluency of ideas than the average student;
4. The intellectually superior student because of his intelligence and sensitivity is apt to be overly critical of his own work;
5. The development of manipulative skills in the intellectually superior student does not correspond to the development of his intelligence, his sensitivity, and his imagination.

The greater awareness of the environment and the greater amount of detail which is perceived by gifted children may equal that of an older child, but other aspects of a gifted child's drawing may not be so advanced. For example, his skill in using his hands for this expression may be only normal, or his social development may not be as developed as other aspects of his growth. These factors will certainly affect his drawing. In some cases, the child may be frustrated by not being able to paint or draw up to the level of his perception. This difference between concept and satisfaction in the drawing itself may be negatively influenced by the teacher if he feels that the "good" drawings are those which come closest to depicting naturalism. Since each child perceives his environment differently, it seems only logical that all drawings will reflect individual characteristics. The amount of "rightness" or growth in a drawing cannot be seen by comparing one child's drawing with another child's drawing; it can only be seen by comparing a child's drawing this month with the same child's drawing a month ago. Comparing drawings of a class should certainly not be done on a competitive basis—that is, finding the best one—but rather on the basis of looking for and putting positive emphasis upon differences. Children in second grade who draw their experience of shopping in the local super market will have many different experiences to put on paper. The sight of rows of shelves laden with food may be of interest to one, the feeling of crowds of big people going hither and thither may be the impression another receives, or the smell of coffee and oranges, or the sound of squeaky carts and clicking cash registers, or even the confusion or excitement may be the most important aspect of the experience to portray. A gifted child might concentrate on any of these or other stimuli. And, comparing one drawing with another except to emphasize the individual qualities is unjust. A gifted child's drawing may or may not be outstanding from the teacher's

[†] Harry Breen, "Creative Art and the Intellectually Gifted" (paper presented at Allerton House Conference of the Illinois Institute For Research on Exceptional Children, 1958).

point of view, but this question is irrelevant. The important question is whether, during the process of working with art materials, the child was challenged with the formation of new concepts, was flexible in his approach to materials, was able to express his feeling to his own satisfaction, and was free to integrate his experiences into an organized whole.

THE IMPORTANCE OF CREATIVITY IN ART

Creativity, as an important factor in a school program, has been given increasing lip service the last few years, but little of broad significance has taken place in new approaches to subject-matter. To a great extent the forces of school are presently concerned with passing on to our children the heritage of the past. With this point of view, the program in general is geared to the acquisition of knowledge. Chairs and desks arranged in neat rows allow the teacher easy supervision of the class, and regimentation makes the task of stuffing information into children easier. It is fairly easy to picture a typical classroom with one standing figure, the teacher, doing the thinking; for the teacher is the one who, with the help of the school administration, organizes the classroom, plans the lessons, and deals out the rewards and punishments while the seated children are the recipients. Certainly under such conditions there is a positive value placed on conformity, and parroting back answers in a prescribed fashion gets the child a reward of a good grade. For the gifted child, this reward may be fairly easy to achieve, and there is usually no incentive to look for deeper rewards elsewhere. The end-product, under these conditions, takes on great meaning, and those who find the memorization of dates and formulas trying or boring will often go to great lengths to receive the rewards given for a perfect paper without going through the process of doing the tasks involved. Even the incentive for cheating is bound up in the system itself and may not be limited to those of lower intellectual level. Developing creativity in gifted children becomes of tremendous importance when we realize that these are the children who will have to revise, change, and remake our world in coming generations. The acquisition of knowledge in history, arithmetic, English, science, or art will avail our society nothing unless the opportunity to change, remake, and originate new forms is made available to all children, especially the gifted. This is a point which needs emphasis. The world as we inherit it from our forebears is not the same world we leave to our children. The meaningful changes to civilization are made by and for people.

To *create* means to grow, to *grow* means to change and experiment. For the teacher this means exploring the unknown, this is the very opposite of following the comfortable lesson plans, of following the patterns, of following the classroom procedures set up years ago, of letting the clock

and the syllabus dictate the daily routine. For the teacher, *creating* may be the very opposite of that which she feels is looked upon by administrators as important: a neat, orderly classroom with quiet children sitting in straight rows and with window shades at half mast. Creativity is filled with danger for the timid teacher.

To teach toward creativity, however, is worth the initial insecurity, for here lies the future of society, in a thinking, doing, questioning, re-evaluating new generation. Surprisingly enough, encouraging creative thinking in children is not difficult, especially in those who have not spent a number of years in a stultifying school environment where individual initiative is repressed. A change of focus from product thinking to process thinking, from giving rewards for conformity to giving rewards for individual initiative, from teacher domination to group planning, from subject-matter goals to children's needs—such change will make a large step toward organizing our heritage into a tool for students to use to explore and create a new and exciting future.

The term *creativity* needs some clarification, and we have some help on this score from a number of people who have delved into this in a formal way.⁸ With this information, the concept of creativity becomes more defined and can be segmented into more understandable and even teachable factors. There seem to be several abilities or components of creativity which can be identified, and these should be mentioned briefly.

One is *flexibility*; that is, the ability to change set or to be able to adjust quickly from one situation to another. This ability to adapt quickly is the opposite of being stuck in a rut in one's thinking. Many art projects necessitate constant change in thinking. Water colors, which may be used by older children, run in unexpected patterns, requiring a constantly changing approach to the painting as it progresses. New and unusual materials can be used to express usual things; for instance, foil, straws, and bottle caps can be used to make a picture of spring today, and tomorrow used to construct a racing car.

Another factor of creativity is *fluency*. This is the ability to produce a large number of ideas in a short period of time. There may be both a

⁸ Manuel Barkan and Ross C. Mooney, *The Conference on Creativity—A Report to the Rockefeller Foundation* (Columbus, Ohio: Ohio State University, 1953); W. Lambert Brittain, "An Experiment Toward Measuring Creativity," *Research in Art Education*, 7th Yearbook (Kutztown, Pa.: National Art Education Association, 1956), pp. 39-46; J. W. Getzels and P. W. Jackson, "The Meaning of Giftedness," *Phi Delta Kappan*, Vol. 40, November 1958, pp. 75-77; J. P. Guilford *et al.*, "The Relations of Creative-Thinking Aptitudes to Non-Aptitude Personality Traits," *Reports from the Psychological Laboratory* (Los Angeles: University of Southern California, 1957); and Viktor Lowenfeld, "Current Research in Creativity," *National Education Association Journal*, Vol. 47, November 1958, pp. 538-540.

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THE IMPORTANCE OF CREATIVITY IN ART

Creativity, as an important factor in a school program, has been given increasing lip service the last few years, but little of broad significance has taken place in new approaches to subject-matter. To a great extent the forces of school are presently concerned with passing on to our children the heritage of the past. With this point of view, the program in general is geared to the acquisition of knowledge. Chairs and desks arranged in neat rows allow the teacher easy supervision of the class, and regimentation makes the task of stuffing information into children easier. It is fairly easy to picture a typical classroom with one standing figure, the teacher, doing the thinking; for the teacher is the one who, with the help of the school administration, organizes the classroom, plans the lessons, and deals out the rewards and punishments while the seated children are the recipients. Certainly under such conditions there is a positive value placed on conformity, and parroting back answers in a prescribed fashion gets the child a reward of a good grade. For the gifted child, this reward may be fairly easy to achieve, and there is usually no incentive to look for deeper rewards elsewhere. The end-product, under these conditions, takes on great meaning, and those who find the memorization of dates and formulas trying or boring will often go to great lengths to receive the rewards given for a perfect paper without going through the process of doing the tasks involved. Even the incentive for cheating is bound up in the system itself and may not be limited to those of lower intellectual level. Developing creativity in gifted children becomes of tremendous importance when we realize that these are the children who will have to revise, change, and remake our world in coming generations. The acquisition of knowledge in history, arithmetic, English, science, or art will avail our society nothing unless the opportunity to change, remake, and originate new forms is made available to all children, especially the gifted. This is a point which needs emphasis. The world as we inherit it from our forebears is not the same world we leave to our children. The meaningful changes to civilization are made by and for people.

To create means to grow, to grow means to change and experiment. For the teacher this means exploring the unknown; this is the very opposite of following the comfortable lesson plans, of following the patterns, of following the classroom procedures set up years ago, of letting the clock

and the syllabus dictate the daily routine. For the teacher, *creating* may be the very opposite of that which she feels is looked upon by administrators as important: a neat, orderly classroom with quiet children sitting in straight rows and with window shades at half mast. Creativity is filled with danger for the timid teacher.

To teach toward creativity, however, is worth the initial insecurity, for here lies the future of society, in a thinking, doing, questioning, re-evaluating new generation. Surprisingly enough, encouraging creative thinking in children is not difficult, especially in those who have not spent a number of years in a stultifying school environment where individual initiative is repressed. A change of focus from product thinking to process thinking, from giving rewards for conformity to giving rewards for individual initiative, from teacher domination to group planning, from subject-matter goals to children's needs—such change will make a large step toward organizing our heritage into a tool for students to use to explore and create a new and exciting future.

The term *creativity* needs some clarification, and we have some help on this score from a number of people who have delved into this in a formal way.⁸ With this information, the concept of creativity becomes more defined and can be segmented into more understandable and even teachable factors. There seem to be several abilities or components of creativity which can be identified, and these should be mentioned briefly.

One is *flexibility*; that is, the ability to change set or to be able to adjust quickly from one situation to another. This ability to adapt quickly is the opposite of being stuck in a rut in one's thinking. Many art projects necessitate constant change in thinking. Water colors, which may be used by older children, run in unexpected patterns, requiring a constantly changing approach to the painting as it progresses. New and unusual materials can be used to express usual things; for instance, foil, straws, and bottle caps can be used to make a picture of spring today, and tomorrow used to construct a racing car.

Another factor of creativity is *fluency*. This is the ability to produce a large number of ideas in a short period of time. There may be both a

⁸ Manuel Barkan and Ross C. Mooney, *The Conference on Creativity—A Report to the Rockefeller Foundation* (Columbus, Ohio: Ohio State University, 1953); W. Lambert Brittain, "An Experiment Toward Measuring Creativity," *Research in Art Education*, 7th Yearbook (Kutztown, Pa.: National Art Education Association, 1956), pp. 39-46; J. W. Getzels and P. W. Jackson, "The Meaning of Giftedness," *Phi Delta Kappan*, Vol. 40, November 1958, pp. 75-77; J. P. Guilford *et al.*, "The Relations of Creative-Thinking Aptitudes to Non-Aptitude Personality Traits," *Reports from the Psychological Laboratory* (Los Angeles: University of Southern California, 1957); and Viktor Lowenfeld, "Current Research in Creativity," *National Education Association Journal*, Vol. 47, November 1958, pp. 538-540.

fluency factor which is verbal and one which is nonverbal, but among the important features of a creative person is his ability to come up with numerous ideas on a problem and its possible solutions. Drawing many quick "thumbnail" sketches for a painting, or making a dozen different design ideas for a lamp requires this capacity.

A third factor is *originality* or the ability to think of new or novel responses. This is the opposite of the usual or accepted. As already pointed out, there is often great pressure on children toward conformity in the school system, without the opportunity for them to make original contributions. Art not only provides the opportunity to express the new or novel, it stresses originality and frowns upon the stereotype.

A fourth factor may be identified as *sensitivity to problems*, that is, a heightened awareness of things around us, not just perceiving what is there but a process of finding defects and needs, of seeing the unusual or that which may be overlooked by others. This sensitivity or sharpening of the senses is another area that is dealt with specifically in the arts. This awareness of the environment is strongly motivated from kindergarten, with children drawing their experience of hugging their favorite doll, to high school where the polished grain of wood can be an exciting thing to sensitive students.

Another factor is the capacity for *reorganization or redefinition*. Transforming an existing object into one for a different use or function is basic in an art experience. Here experimentation with materials and rearranging and reorganizing elements on a wall for a mural, or on paper for a painting, or the cutting and putting together of a wood project utilizes this ability to reorganize.

There are other factors of creativity less clearly defined which may not be as generally applicable to all fields but pertain more to specific areas of learning. Such factors include an ability to think abstractly, an ability to transpose objects mentally in space, and possibly an ability to handle complexities.

The factors which make up creativity are also those factors which are constantly utilized in an art experience. Some evidence shows that creativity in the arts is the same basic creativity that is found in the sciences.⁸ Art plays a vital part in curriculum planning for the gifted if for no other reason than its one basic ingredient—creativity.

The Kind of Environment Which Encourages Creative Art

A physical environment which can promote an active mind is probably not as important as the teacher, but this environment is often a direct

⁸ Kenneth R. Beittel, "A Comparison of Brittain's and Guilford's Tests of Creativity" (unpublished study, Department of Art Education, The Pennsylvania State University, 1955).

reflection of his standards and values. Intellectually gifted children should feel that their room is a place in which things happen. The atmosphere, the arrangement of furniture, the location of materials are all organized for an active, thinking, doing group. From the janitor's point of view, a certain sixth-grade room may be the hardest in the school to clean; you never can tell where the chairs and tables will be: pushed over in a corner, arranged in a circle for discussion, or in several small groups in various parts of the room. How do you expect a janitor to clean a room like this? Now, the nice sterile room next door is so much easier to clean. There, the desks are always in neat order, easy to sweep around. There are never any scraps of paper on the floor or bits of clay to mop up in that room. The drawing paper is located high enough on the shelf so that the children can not reach it, and the supply of paint has not been touched in months. Yes, that is the room the janitor likes to clean, even though the teacher is a little stuffy.

The room the janitor does not like to clean is full of interesting things that slow his sweeping. The mobiles are hanging up by the window, the mural that is not quite finished is covering up the back blackboard, the box of paper scraps and foil is ready for tomorrow's "feeling" picture. The plastic bags of clay on the shelf even look like they would be fun for him to stick his hands in. And what are those colorful pictures by Klee and Chagall doing hanging down where children can touch them instead of up above the blackboard like the pictures of the coliseum and George Washington are in the other room?

The teachers are quite different, too. The one in the neat room has his lessons carefully planned, every minute is organized, and his only problem seems to be in keeping certain children under control. The intellectually gifted children are expected to do more than the others, and those children who finish their work are rewarded by being allowed to draw a picture. The teacher in the "disorderly" classroom has some different ideas. The children help her plan the program, their ideas are accepted and even sought after; the "teacher" way is not the only right way, rather each child is free to have his own goals. The feeling of belonging is very strong, for the children do things together because they are interested and not because the clock has struck ten twenty-two. Art plays an extremely important part in this program. One gifted girl has spent hours in reading about Spain so as to make sure she has the proper costume for her puppets. The boys, who are working on the mural, are busily measuring another piece of paper to extend their city another two feet in order to put in a sewage disposal plant. The mobiles hanging by the window started a discussion on balance that lasted a good part of the afternoon. It is difficult to tell where art stops and where other subjects begin.

The teachers are quite different in other ways too. One is interested in

trying new things; teaching is an exciting venture, for in it he finds himself growing, he likes finding out answers with the children, he enjoys painting a little himself, and his favorite hobby is cooking up new dishes. On the other hand, the orderly teacher looks upon school children as his responsibility and takes pride in showing off the gifted youngsters in his class.

To summarize these environmental influences on creativity, the teacher is most important. He must believe in and live a full, creative life and must communicate this to children. He must care about children, their growth, and directions of development first, and not evaluate them by some external, arbitrary yardstick. His classroom should reflect his thinking and in itself present a stimulating, creative atmosphere.

ART IN THE ELEMENTARY SCHOOL

Some Thoughts on Planning for Art in the Elementary Curriculum

Several sources provide help in planning an art curriculum.¹⁰ Books on the subject can be of great help, but if an art supervisor or consultant is available, make good use of him. A number of elementary programs are still bound too tightly to the clock; the time set aside for art may not coincide either with the present direction of the class motivation or with the length of the attention span of the children. Although having the art specialist occasionally introduce new materials or present new motivations is helpful, best use can usually be made of his time by having him plan the program with the teacher. Gifted fifth-grade children may become involved in making hand puppets, and possibly the art specialist can set aside time to help the children plan for a stage at this point. If this interest in puppets grows so that the children use this as a step toward drama, the art specialist can again assist in suggesting further materials and methods. The art teacher or specialist is a valuable resource person, and his advice should be sought especially when planning an enriched program for the gifted.

Planning special art projects for a superior group or, as in the usual elementary classroom situation, planning two or three projects so as to have one suitable for each of the many ability groups is not necessary. If the initial planning has been carefully thought out, if the material is flexible enough for many interpretations, and if the teacher has motivated the

¹⁰ Laura Bannon, *Mind Your Child's Art* (New York: Pellegrini and Cudahy, 1952); Natalie Robinson Cole, *The Arts in the Classroom* (New York: John Day Company, 1940); Charles D. Gattskell, *Children and their Art* (New York: Harcourt Brace, 1958); Viktor Lowenfeld, *Creative and Mental Growth*, 3rd Ed. (New York: Macmillan Company, 1957).

group strongly, every child can work at his own level and attain a sense of achievement and satisfaction. Where rigid plans are made, where set results are expected or demanded, then the experience may be disappointing and frustrating to the children, regardless of the appearance of the end-product.

For example, the opportunity to work with paper for Christmas decorations can be either challenging for the gifted or a waste of time. Let us examine an all too typical example. A teacher distributes a nine inch square of red paper to each child, then scissors and rulers. He then waits for all to focus their attention upon him. If any child fingers the paper in advance, the paper is removed, and he watches the rest. The teacher then gives instructions to fold the paper in a prescribed fashion, and the children dutifully follow, if they are able. Then the scissors are used with one cut here, one there, and the Christmas decorations are complete except for the string which the teacher will tape on after the children have gone home.

The opposite approach to this project might be to have a variety of sizes and colors of paper. The motivation would be both a discussion of what is a Christmas decoration, how it looks, how it should make you feel, and also a discussion of some ways to make the paper express lightness, joy, or warmth by cutting, folding, twisting, punching, ravelling, tearing, and so forth. The children would be free to select and to experiment with a great variety of possible solutions. A gifted child thus would have the opportunity to make more complicated forms, a greater number of different solutions, or a more intricate design; at the same time others in the class might be challenged merely by the use of scissors and be satisfied with a simpler decoration.

On the elementary level, art should provide the opportunity for a gifted child to express his emotions and reactions to his environment. Art should be a fun time, a chance to get a sense of fulfillment and joy from accomplishments. Art should provide the opportunity for growth, both from an organization of and a redefinition of past experiences and through an exploration and experimentation with new experiences. Providing each child a rich motivation with appropriate material is important because only then can the child achieve a sense of satisfaction through the process.

The Question of the Cost of Art Materials for an Elementary Program

The cost of an art program is usually directly related to the material used. However, the more expensive program is not necessarily the better one. The question of the cost of materials becomes important only when art experiences for children are curtailed because of the lack of funds to provide the necessary raw materials. If a teacher working with gifted

children is limited in the materials available for a given year, this in turn affects the freedom with which he provides this valuable experience; this situation is an injustice both to the children and to the teacher. But expensive materials are not that important to an art program.

In the elementary school basic materials should provide for drawing, painting, and three-dimensional work. These might be crayons, manila paper, tempera paint, brushes, and clay. The art supervisor can quickly point out that the cheapest buy in these is not usually the best. In addition to these basic materials, the teacher can take numerous measures to supply herself with ample raw materials. The children are often eager to help in such a project of collecting materials. Newspapers and wallpaper paste make excellent paper maché puppets, or kites, or banners; with the addition of scraps of cloth, the puppets can be clothed, the kites can have tails, the banners can add to their durability. Boxes, big and small, provide excellent blocks for building or boats, or, pasted together, they may be horses or dragons. Bottle caps, straws, and scraps of paper make wonderful collage material. Insulating blocks or soft brick can be carved, and natural clay in a nearby stream bank can be just as good for modeling as that purchased for the purpose. Old crayons can be melted up to paint with; various seed pods and nuts can be colored and used for decorations; large wrapping paper can be the background for a mural, shelf paper and thin, colored wallpaper paste or starch can make the ingredients for finger painting.

The materials, then, although important to an art program, play a secondary role, and the approach to these materials a primary role. That is, the materials are not as important as the way in which they are used.

Problems Related to Special Art Lessons

From time to time, a teacher is asked if he thinks little David has any art talent. Usually, David's mother wants him to be a well-rounded citizen; to insure this, such things as music lessons, dancing lessons, riding lessons, foreign-language lessons, and art lessons are taken each succeeding day after school. Of course, this illustration may be a little exaggerated, but surprisingly often the youngster may be unwillingly pushed into a parent-planned program to such an extent that important areas like social, physical, and emotional growth, which can come from after-school play, are often ignored. Maybe, the question of whether David has art talent and whether he should have art lessons are two different questions.

The identification of art talent is a complex problem. Even the question of who is the *real* artist on the professional level would be difficult to answer. The term *art* is so broad and includes so many fields that apparently different talents are needed for each area. Painting, often con-

sidered the leader of art because it tends to be more experimental, has many different facets, and history shows us that great painters are often unnoticed in their own generation. How then can a fifth-grade teacher pronounce judgment on little David except to say whether he is interested or enjoys working with art? Perhaps these criteria are the best indication anyway—his interest and enthusiasm.

Of course, if David faithfully copies one of the comic book characters, he may get some recognition from his classmates, or if he has perfected a horse that looks so real, his parents may believe they have a budding Rembrandt, but *nothing is further from the truth. These copied pictures or repeated patterns show David's lack of confidence to draw on his own. These symbols may often be repeated because of the praise they stimulate and not because the child enjoys the experience, or they may be used as a stereotype to keep from having to think. On the other hand, David may have a genuine interest in and liking for art. His experimentation and originality show the better prospect for art.*

The second question, "Should I have David take art lessons?" is also not an easy one to answer; but unless you know the circumstances, the better answer is usually no. The reason for this is quite simple. Often a local artist who has built up some reputation will be asked to teach children. Since his background is not in education, there may be serious conflict between what children can and should paint and draw and what our artist friend expects of them. Often the artist will simply try to teach these children, step by step, the same methods which he as an artist has found successful, and the children's own natural urge for expression is thwarted. Such teaching can and does do great harm to a child. However, a teacher who has an understanding of children and of art can make a great contribution, furthering children along the line of their own expression. Occasionally universities or museums (who offer Saturday art classes) will be near enough, and these are usually well worth whatever time is involved for mother to get David back and forth. These classes give him an opportunity to explore a variety of materials, and usually they have a person in charge who is in the field of art education, and who is interested in the children and their creative efforts.

ART IN THE SECONDARY SCHOOL

Some Thoughts on Planning for Art in the Secondary Curriculum

In the junior high school, the usual art program is to "introduce" art as a unit along with shop, music, and homemaking. These art classes are usually the last that most children will have. After children have had one

teacher for most of their activities in the lower grades, placing them in special rooms with different subject-matter specialists in the junior high school may have negative features for the art program. This practice tends to put pressure on the art program to produce a course of study somewhat comparable to the so-called academic subjects. This assumes that certain axioms and rules must be learned about the areas of drawing and design. Abundant color wheels are turned out yearly to testify to this. During junior high the rules of perspective are usually taught, and such terms as balance, rhythm, opposition, unity, and harmony are drilled into students. Art is often treated as an area of learning apart from children rather than as one deeply rooted within them.

Of course some excellent programs are underway in the secondary schools, but these are the exception rather than the rule. Too many programs start with the objective of teaching toward easily measurable goals. This in part may be attributed to the emphasis placed upon objective tests and easily defended standards. However, recent attempts to define and measure values and attitudes may, in time, help teachers recognize that to change attitudes or to establish values in young people is worth attempting. This is a crucial time for sensitive guidance of children as they form their aesthetic concepts, for concepts formed at this age tend to continue with them through adulthood.

A gifted junior high school student needs broader horizons for the field of art than the mastery of so-called factual material. The value of an art experience in terms of an individual is far greater than the checking off of completed projects in the roll book. This age has particular problems of adjustment in physical, mental, and social development. Art can provide an opportunity for these students to confront themselves with each of these personal concerns—first in a subjective way, and then in an objective way, as he paints and is affected by the painting. Art provides an opportunity for the adolescent to put into form his concern over himself, both through the use of the imagination and in an involvement of the self in an aesthetic experience.

The discrepancy between the mental development of a gifted child and his ability to put his thoughts on paper is one of the biggest reasons why a number of gifted adolescents assume the attitude that they have no artistic talent. Because of this critical attitude, the adolescent finds it difficult to accept his childish representation for an object. To side-step attempts at photographic realism, the crafts have been favorite art media for use with junior high school children. This has certain drawbacks for teachers or counselors without a strong background in the arts. A summer camp for girls or boys may have an arts and crafts period in which the campers have a choice of putting together pre-stamped leather belts or pre-cut key cases. Where the design is not already embossed on the material, several

patterns are often distributed to copy, such as a deer, sailboat, or cocker spaniel. The mere lacing together of these projects contributes nothing to an adolescent's growth, it only keeps him busy; and a gifted student may not even complete the project.

In numerous excellent summer camps or school programs in the country, busywork projects are discarded as sham. Meaningful projects can provide maximum opportunity for the use of the senses, for exploration, and for the flexible use of materials. If in addition a gifted child finds it difficult to compare his product with that of an adult, so that there is no apparent right or wrong solution, then such a project is truly an art experience.

An illustration would be a motivation such as making "people we might find on Venus." How long will it be before we are able to investigate the planets? What is the atmosphere like on Venus? Could any organisms be living on Venus? As people we are peculiarly well suited to living on the earth. Our feet are a good size for walking about without sinking into the earth; our noses are pointed downward so that we will not drown when it rains; and our eyes are located near the top of our bodies to give maximum sighting distance. What would a creature be like to survive on Venus? Would he be squat, with eyes in his feet to look under the cloudy atmosphere? Would his legs come down to a point so as to stick into the surface, or would his feet look like snowshoes so as to ride over the surface of Venus? Would he be black to absorb light to keep him warm, or green like a frog because he is cold-blooded?

Given the opportunity to delve into some theoretical aspects of a problem and then to attempt to find a solution (as in making the kind of creature you might find on Venus) can be a thrilling experience. Obviously, the problem has no right or wrong solution; and any expressed inability to draw "so it looks like something" should disappear.

Material for a project like our Man from Venus could be almost unlimited. Paper maché might be excellent because this material is pliable, inexpensive, and requires some degree of manipulation. A physically active group of boys might enjoy carving from building blocks; scrap materials might provide an exciting approach with the possibility of using buttons for eyes or straws for feelers. Digging clay and modeling it into a Man from Venus might work well for a summer camp experience. A number of good books can be used for reference in this connection.¹¹

Unfortunately, with the final required art class in the junior high school, most children come to the end of their formal art experience. Occasionally a gifted student is given a "broadening experience" in some of the academic classes to fill in the gap between what the rest of the class is doing

¹¹ Doris Cox and Barbara Weissman, *Creative Hands* (New York: John Wiley and Sons, Inc., 1945); and Edward L. Matul, *Meaning in Crafts* (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1959).

and what he himself has already done. In some cases this "broadening experience" is looked upon by the youngster as punishment for getting ahead. Usually included under this heading is some sort of art project, such as drawing a picture of Lincoln at Gettysburg, or of methods of transportation from the beginning of time until now, or of a pie cut up into percentages of tax revenue, or of a brontosaurus wandering around chewing tree tops. Otherwise a gifted student is usually steered from art courses in the upper grades in order to concentrate on the academic subjects for their prestige value and to insure his acceptance into college.

We must take issue with several of these accepted practices as being contrary to what we know about child development. The piecemeal method of dividing public school education into rigid convention-bound subject-matter areas does injustice to the student. It prevents interaction of these areas upon one another and denies the possibility of interrelationship. Could political history have had something to do with Newton's discovery of the law of gravity or with the writings of Keats or with the paintings of Gainsborough? Also, this method considers only the acquisition of these particular fields of knowledge and not their effect upon the person as a whole. The acquiring of certain knowledge, then, can become an end in itself, with no attention being paid to the student's reaction or feeling and certainly with no thought of how this knowledge may be applied.

Art used in its broad sense has a greater role in education than that of filling out the day for a gifted student. In the process of making an object of art, either two or three dimensional, the artist of any age must go through a meaningful educational process. The selection, comparison, interaction, presentation, utilization, experimentation, and search which goes on between the artist and that which he is making not only stimulates his mental processes but affects the artist in other ways as well. The concept that education can best be accomplished through the arts is not novel. Probably the best known work in this area is *Education Through Art* by Herbert Read¹²

Freeing gifted students from the restrictions of devoting only a prescribed forty-five minutes to each school topic has tremendous advantages. Getting a brief smattering of the social studies, then quickly being transported to one of the sciences, and then completely dropping any interest that may have begun there by dashing to an English class may have ill effects upon the gifted. Such qualities as longer attention span, quicker mastery of material, and strong motivation, which characterize gifted adolescents, should be capitalized upon in the educative process. Forcing a compartmentalized brain upon those students most capable of seeing and utilizing interactions between subject fields is unfortunate.

¹² Herbert Read, *Education Through Art*, 3rd Ed (New York: Pantheon Books, 1958).

An historical mural, possibly on the wall of a classroom, could be an exciting adventure for a high school student. A project as large as this would require considerable planning. Whatever portion of man's development is selected to be portrayed, would certainly need to be carefully reviewed to see what is of most significance. How do these elements affect one another, and how can our student portray them to show their impact? *Changing location, changing size, selecting color, determining method of painting, abstracting some elements, looking at the period of history through the eyes of one living at the time, being a person who was there—* in these ways the artist affects the mural, but the mural in turn affects the artist. Many things happen in such a project that can not be measured by objective tests. Certainly some of these things are art, such as the relationship of one area to another, the organization of the whole, the play of colors, the handling of materials. Some of these things are history: the subjects portrayed, the value placed on certain events. But some of these things may be more important than learning art elements or historical facts. *The unification of many ideas into a coherent whole, the identification with another time and place, the synthesis of ideas, the selection of meaningful parts, and their presentation in a visual form of expression* may be more important to a student than many hours of assigned historical readings. He has an opportunity to interpret, not to memorize.

The construction of a soap box racer may embody, for a gifted boy, more art, mathematics, physics, and industrial arts than he would get in a comparable length of time spent in the usual classroom problems. The planning and drawing of the car will take considerable thought. What is the best length? Will a heavy or light material make the racer go faster? How low should the center of gravity be? Where can one obtain bearings for the wheels and how much will they cost? How can the top and side and bottom be drawn so as to compare views readily? What is the best way of putting the racer together? How can the steering control be increased? These are meaningful questions and demand meaningful, workable answers. The racer becomes a learning device with which the boy can identify. The problems and theories in physics become real, mathematics has practical application, industrial arts become more than merely learning techniques.

Surprisingly, of the many young scientists who are recognized for outstanding achievements by various private and governmental agencies, few have worked on their rewarding projects in the public schools unless there has been an inspiring teacher who promoted individual activity during the only time available—after school.

On the secondary level the role of art can be tremendously important for the intellectually gifted as a means of stimulating creative thinking, as a means of unifying the curriculum through the integration of subject-

matter, as a means of providing a positive outlet for feelings and emotions rebelling against an existing society, and as a means of confronting oneself with a changing image of himself in relationship to his environment.

A Career in Art for the Intellectually Gifted

At times, a question arises as to the future in art as a vocation for the gifted. This is a serious question and one deserving thought if the goals and skills of the young man or woman point in this direction. The problem of the identification of art talent will be discussed later. However, a number of so-called art tests or draw-me talent tests that appear from time to time have questionable value except to be a potential source of income for the agency publishing the talent tests. In view of research evidence¹³ the value of a psychological or guidance approach as used in some schools to assess one's potential talent in the arts might now also be questioned. Possibly the best criterion for determining success would be positive evidence of the interest and enthusiasm of the person himself for the career of art. Certainly the winning of a local poster contest or the painting of an oil painting should not be the basis on which to commit one to an art career. The pleasure and satisfaction received from painting, constructing, planning, or even doodling should be a bigger factor in helping to determine a career than whether the painting, radio cabinet, floor plans, or sketches are judged as being good.

The discovery of those talented in the arts has been a difficult thing in the past; at least a number of artists whom we consider to be great painters were not recognized in their day as having a major influence in the field of art. We cannot predict who will be the Cezanne or Picasso of tomorrow by comparing pictures of children with adults. A clear determining factor of future success is the enjoyment of the process and the development of original, creative thoughts in the arts.

Although specialized art schools have an important place in our society, the intellectually gifted child had best take advantage of the broader liberal education offered at many universities and there incorporate the development of skills in art into his curriculum. If our universities are to produce better architects, landscape architects, painters, art educators, industrial designers, interior designers, and so forth, they must have capable students. The shaping of our whole visual world may well be influenced by those gifted students who are not only allowed but encouraged to enter the arts.

Art Beyond School

The number of statesmen, businessmen, scientists, professional men (including women in these categories, too) who paint as a hobby is amaz-

¹³ W. Lambert Brittain, "An Experiment Toward Measuring Creativity," pp. 39-46.

ing. In addition, large numbers of people turn to crafts—weaving, pottery, metal work, knitting—for some of the same reasons. The hobby of wood-working in the home carpentry shop provides a constant source of business to lumber mills and tool manufacturers. Exhibits of “Sunday Painters” are held in almost every sizeable community in the country. These people—gifted people—turn to art for a number of reasons. To one it is relaxing, “I feel refreshed after a busy day, just getting out my brushes and painting for an hour”; to another it is stimulating, “Makes me feel like living again”; to another it is a friend, “I don’t know what I would do without being able to work in my woodshop.” Whatever the reason, art fills a void and makes a positive contribution to these people.

Life has certain complexities for most of us: tensions, worry, risk. In some cases, we as people have little control in a personal way over that which is our livelihood—stocks rise and fall without our consent, the products we sell are made thousands of miles away, we compute stress of materials on buildings we did not design. Perhaps the personal involvement, the satisfaction of being in control of the beginning and the end of a work of art, plus being able to reflect upon it later, is compensation for a loss of the self in society. The value which creative art has for the retired and the therapeutic value which art has for the mentally ill are well recognized; however, these same values for the rest of the population should not be overlooked.

One of the objectives of art for the gifted can be as an avocation. Certainly the pleasures and satisfactions which come from working with art materials should be made available to all, even though the possibility of becoming a renowned painter may not be very great. The expectations of the art teacher of a class of intellectually gifted children would be fulfilled if he could encourage an active interest in and satisfaction in art that would continue to provide enrichment for their lives after they leave school.

THE IDENTIFICATION AND TRAINING OF THOSE TALENTED IN ART

The Identification of Those Talented in Art

A number of years ago the author observed a fifth-grade teacher in his classroom as he talked about how much his children loved art. He pointed out one boy who was wearing a sweater much too large for him and who looked as if a good bath would be in order. He said the child had no talent in art at all. Some of the other children could do some very lovely things, he said, but that boy’s art work was horrible. He thumbed through a bunch of drawings of the tightly drawn and carefully colored type until he came upon one which was a riot of color, drawn with bold strokes of purple and vibrant with feeling. It reminded me at once of some

of Roualt's paintings. Glancing at me, he smiled triumphantly—"See, always this crude scribbling, no talent at all!"

Probably each teacher has his own art standards; and these likes and dislikes are, consciously or not, transmitted to students. In some cases the recognition of talented youngsters may be related to how close the child can come to satisfying the taste whim of his teacher. Educators with training and experience in art realize that art of children cannot be compared with what is considered best from an adult point of view. At one time art for children was primarily training in how to draw like adult artists. Academic standards of goodness and poorness were applied. We have now come to recognize that child art deserves respect in its own rights. It is not an immature attempt at copying artists' techniques; it is primarily a natural form of expression. The freshness and directness with which young children put down their thoughts is often the envy of the professional artist.

Each age can be distinguished by the art it has produced. Certainly the modern paintings presently being exhibited at galleries throughout the country would not have been looked upon as art a century ago (and by some people today are still not looked upon as art). The standards of aesthetic quality change for each age. Not very long ago the ultimate in beauty was embodied in the Golden Age of Greece. Nearly direct transplants of Greek temples were used for schools and government buildings, Greek motifs adorned our houses, the Winged Goddess of Victory and Venus de Milo were looked upon as the classic form of beauty, and even truncated columns with bird baths on top could be bought at the local hardware store. Today our society seems to have different standards of beauty. A copy of a primitive African fertility symbol in ebony is now more acceptable on the mantel than a marble miniature of the Laocoon. A "beautiful" home today may seem more representative of the Asian culture than of any European counterpart. With constantly changing aesthetic standards, no doubt fifty years from now new forms of art will be representatives of our age, and these new forms will be advanced by those children whom we now have in school. It may seem a little strange, then, to try to evaluate the products of children or adolescents in terms of our present standards when these standards will become only historically interesting when these youngsters reach the height of their careers.

In spite of the problems, the identification of children talented in art has been attempted by numerous people, using tests of aptitude or achievement.¹⁴ The majority of these art tests were standardized in the early *nineteen thirties*, and although some have been revised, most of them bear the stamp of the artistic standards of that time. These art tests usually

¹⁴ W. Lambert Britton, "An Experiment Toward Measuring Creativity," pp 39-46

have scales to measure drawing or other abilities, or are of the preference type; that is, selecting the better of a pair of pictures. These tests, in fact, do not measure art ability; they only measure how closely the student agrees with the "correct" responses set by the test authors. In recent years, the identification of artistic talent has been recognized as a complicated problem, and the use of standardized tests to identify artistic talent has become less popular.

Utilizing whatever means they can, school systems are attempting to identify the artistically talented. In one large city in New York State all teachers and guidance counselors are encouraged to be on the alert for signs of potential talent in art in the fifth, sixth, and seventh grades.¹⁵ Usually the art specialist identifies those students who appear to have talent. Because of the structure of our school system, most children take no art after eighth grade. This then means that, if art courses in secondary schools are to be filled with talented youngsters, these youngsters need to be identified and encouraged early. Yet as we pointed out: adults, including teachers, have particular likes and dislikes which influence their judgment; each age has its own set of aesthetic standards; we would be doing an injustice to restrict the development of aesthetic standards by rewarding only those children who mimic today's artistic taste; and after all, child art is not adult art and should not be compared with adult art! How, then, if it is important, will we find the artistically talented child?

To a teacher who has worked with children any length of time the answer may seem fairly obvious—you can just tell! But the answer may not be this simple. One study of the literature concerning the child gifted in art,¹⁶ in discussing the identification of artistically talented children, found first, that the child has a persistent interest in art; second, that he works at it for extended periods of time; and third, that he has a vigorous creative imagination. A study of children's art abilities at the Cleveland Museum of Art¹⁷ reported that those judged as having special art ability differ from those with average ability only in degree: ". . . the Specials are heightened Averages." This report further stated that the specially talented tend to translate their experiences into a visual medium. In other words, the talented child in art is not much different from the average, except that he may be constantly drawing and painting his experiences in a creative manner. Note that the focus is on the child and not on his product.

¹⁵ The University of the State of New York, *56 Practices for the Gifted* (Albany: The State Education Department, 1958), p. 95.

¹⁶ Barbara Parslow Gemignani, "The Gifted Child in Art," *Research in Art Education*, 7th Yearbook (Kutztown, Pennsylvania: National Art Education Association, 1956), pp. 8-17.

¹⁷ Thomas Munro, *Art Education, Its Philosophy and Psychology* (New York: The Liberal Arts Press, 1956), pp. 209-236.

In discussions of the identification of the child talented in art, what is usually meant is identification of the child talented in drawing and painting. If we try to analyze the adult professional world of art, we find that artists who actually make a living by producing and selling paintings are limited in number. A much larger number of people are professional architects, interior designers, art teachers, textile designers, industrial designers, sculptors, illustrators, advertising designers, graphic artists, furniture designers, art historians, museum curators, ceramists, landscape architects, and so forth. We might be in a rather peculiar position if we were to maintain that we can identify in the fifth grade those children who are potentially talented in architecture or those who are potentially talented in art history. Obviously, these fields of art are quite different. But so are the fields of clothing design and community planning or cabinet making and portrait painting. Art can be both theoretical and practical, both scientific and aesthetic, both social and personal. Looking at the broad scope of art, then, we might hesitate to pick out an "artistic type" child from the fifth grade and say that he is a potential artist or go even further and say what type of artist; just as we would hesitate to point to the girl behind him and say that she is a potential child psychologist, or that the boy behind her is a potential traveling salesman.

One of the main objectives in selecting the artistically talented is to encourage them to take art courses in the secondary school. This, in turn, means that of those taking art courses and graduating, some will go on to college or art school to continue their studies on an advanced level. An apprenticeship to a sign painter and a beginning position in the printing and layout field do not necessarily require college training. To a great extent, however, the talented youth who graduates from high school must anticipate at least four years of study, not all of which will be in the broad area of art, before he is ready to be a contributing member of society. What comes as a surprise, however, is that the art training which our talented youngster has had in high school may benefit him technically very little in college or art school. In fact, the head of an art department in one of our leading institutions went so far as to say that part of the first year of college is spent unlearning the techniques that were learned in high school art classes. At any rate, at the end of one year of study, there is apparently little advantage from a technical standpoint to have taken art courses in high school. This does not necessarily indicate that the secondary schools are falling behind in the quality of their art courses, for the central objective for an art program is not to provide preprofessional training to a few selected students.

The question of who is the talented youngster is one constantly facing professional art schools. At the Rhode Island School of Design, the director of admissions said that natural abilities are difficult to judge, uncover,

identify, or categorize. The puzzling term "artistic talent" he said, probably has to do with some form of intelligence, sensitivity, imagination, and intuition, and it may have some relation to manual control and dexterity. In addition, curiosity, inventiveness, skepticism, and ambition may be found in the especially talented.¹⁸ Here, again, art talent is thought of as being within a person and dealing with factors which may be difficult to determine from looking at art products alone.

In trying to draw some conclusions about the problem of identifying the artistically talented, we find conflicting views. On the one hand, educators are stressing the importance of locating those children early who show talent, so as to give them special art courses in high school; on the other hand, the technical value of these courses is questioned by college administrators. The early identification of talent seems important, yet we cannot use adult standards of "beauty" to judge children's art work. On the high school level standardized tests are not of great value, for the talented child may be the very one who does not conform to norms. The term "talented" in art connotes an enchanted segment of the population a little removed from everyone else, whereas in reality the talented are no different from average children except in degree. This degree of difference seems more closely related to a psychological approach to living than to any technical skill; that is, the talented in art seem more sensitive to their environment, more imaginative in their responses, more eager to put down their ideas in some visual medium. Their products may be drawings or paintings, but they may also be in other less conventional art material, such as wood, metal, cloth, cement, wire, or cardboard. In whatever form it appears, the product is important only as a record of the thinking that went into it.

The question of exhibits and competitions invariably comes up when discussing the identification of the talented in art. These competitions may be within a classroom, a school, or a city. Sometimes they become regional or even national in size and are sponsored by almost anybody. Prizes are usually given for the "best" judged work of art in several categories. Judges may be almost anybody too, including local artists, visiting dignitaries, or the chief of police. These competitions can do a great deal of harm, not only to the losers but also to the winners. For a child in elementary school, the idea of standards in drawing forces him to become conscious of techniques and detracts from his own natural form of expression. A child has no real understanding of why another drawing should win a prize but not his own. In some exhibits which continue from year to year, children will send in copies of the winning picture of preceding years, hoping to win the prize. For an adolescent, his picture has great significance. To win means he has arrived and is a success, and, like so many adult profes-

¹⁸ Charles A. Dunn, Jr., "Why Enter A Professional School of Art?" *Art Education*, Vol. 9, December 1956, p. 311.

sionals, he stops exploring, experimenting, and seeking new and more adequate ways of expressing himself. The loser, whether the jury was right or wrong, loses confidence in his own ability. This may mean he copies the technique of the winner or stops painting entirely, depending on how much value he places upon the reward. Some exhibits are set up with the purpose of showing the variety of expression possible, or various techniques which have been used, or some other educational purpose. These, if adequately labeled, can be stimulating, but exhibits which offer a prize for the "best" can only be stultifying.

In the identification of the talented in art, at least three dimensions need consideration: first, the person himself—the child, the adolescent, or the adult; second, the *process*—the technique, the manipulation of the material or media; and third, the *product*—a painting, sculpture, or design. To a great extent attempts in the past have focused upon only the last of these three—the product. Competitions, judgments, performance tests, all rely upon the *product* as the criterion of identification of the talented. Although some standardized tests have attempted to get at "native ability," they have done so by examining one or more performances. The area of the *process* or how the person approaches his work—his thoughts, reactions, methods, and use of materials—has been virtually untouched. This aspect certainly has much to offer. A more extensive study of *persons* in relation to talent is also needed. What are the behavioral patterns, personality characteristics, and responses to set stimuli of those who are talented, and how do these compare with the average or norm?

Some research bearing on this last point has already been done. Findings indicate that the artistically talented person may have certain personality characteristics which do differ from those persons who are not as artistically talented. As part of a larger study of creativity conducted at the Pennsylvania State University,¹⁹ several different measures and hundreds of separate judgments were made. As a tangential problem, an intensive study was made of the characteristics of people as reflected in their art products; these characteristics differed considerably between those who ranked aesthetically high, middle, and low. The people who rated high appeared to have qualities such as freedom, spontaneity, self-acceptance, to have a liking for change and variety. Those who ranked low tended to be more conforming, literal, status-bound, and non-committal. If further research substantiates these findings, perhaps the whole problem of the identification of those talented in art will undergo a transformation from looking at the products of children to looking at the children themselves.

¹⁹ W. Lambert Brittain and Kenneth R. Bittel, "Analysis of Levels of Creative Performances in the Visual Arts," *Journal of Aesthetics and Art Criticism*, Vol. 19, Fall 1960, pp. 83-90.

The Training of Those Talented in Art

The type of art program best suited to the needs of those talented in art has been a problem plaguing art educators for years. Almost every book written in the area of art education has some part of it devoted to this problem. Nearly every conference involving artists and educators will have a speaker or a discussion group centered around this topic. But in spite of the obvious importance of this topic, little in the way of concrete curriculum suggestions have been agreed upon. The reasons for this are numerous. The first we have already discussed: the difficulty in locating the artistically talented. Without being sure we have found those who are really talented, we would hesitate to plan a program that would not benefit everybody. The second reason is that a special program for the talented may very well be a good program for those not so lucky. A third reason is the cost and time factor: that is, the cost of additional material and placing the special course in the time schedule of the school system are problems. For these reasons, except for high school elective art courses, most advanced or specialized programs come after school, in art clubs, in Saturday classes (where available) operated by museums or art colleges, or during the summer.

All those interested in the development of the artistically talented agree on one point. This is, whenever and however it appears, an interest in art *in whatever form should be continually stimulated and encouraged.*

In the elementary school the artistically talented are apt to be less specially treated because they are not easily identified and because the elementary classroom teacher is becoming more receptive to and knows more about the art of children. Art is becoming more and more recognized as a creative process involving the total child; his thinking, seeing, and feeling are integrated into a new whole; and the experience of putting into drawing, painting, or clay his fears and joys should be encouraged for every child. The elementary school is usually free of external art standards, and art for the talented is the same as art for the child who expresses himself less surely. In fact, the teacher may bring out the special gold foil for the child who hangs back, or she may show his picture to the class because he is the one who needs his confidence in his own mode of expression restored.

After elementary school those who seem talented may get special treatment, but we have already raised questions about whether those identified as talented in art really are talented. Dr. Jean Holland,²⁰ working in Toronto, collected *hundreds of drawings of intellectually gifted and of slow learners from grades six, seven, and eight and compared the draw-*

²⁰ Jean Holland, "A Developmental Scale for Grades 6, 7, & 8" (unpublished research, Toronto School System, Toronto, Canada, 1958).

ings of the two groups for clues as to developmental levels. Surprisingly, the drawings and paintings of the slow learners were judged aesthetically higher by groups of artists and nonartists. Dr. Holland devised a developmental scale for these grades. The use of this scale gives evidence that children continue to grow artistically with their own standards of aesthetic quality through grade eight.

The junior high school years may be too soon then to begin to give a concentrated program to the artistically talented. Such external influences as teaching color combinations from a color wheel or teaching two and three point perspective may fall upon children not developmentally ready for such material. This does not mean that color should not be discussed as a means of artistic expression; it means that color should be used as an integral part of one's relationship to painting and to the environment. The psychological aspects of color and its meaning can differ with each child, and these meanings and differences can and should be explored. Therefore, the memorization of rules and combinations of color have no place in these grades. Perspective as a natural phenomenon, being explored by youngsters who have suddenly become visually aware of depth in their environment, can be an exciting thing. But the abstract terms of eye level, horizon lines, or vanishing points have little meaning to children who are still developing their perceptual awareness. Thus, in the junior high school, as well as in the elementary school, a good art program for the talented is also a good art program for those who for one reason or another (maybe even high intelligence) are not considered artistically talented.

The general approach for planning a curriculum for upper secondary school youth is to give them an enriched program by planning bus trips to the local museum, to the art gallery, to a contemporary building, and to a print shop; and, in addition, to give them special independent projects and allow them to work with a greater number of materials that may be too expensive for the regular art classes to use. The artistically talented youngsters are usually called upon to exhibit their talents for the class yearbook and school newspaper, as scenery painters for the Christmas play and the spring dance, and to make posters for the annual fund-raising campaign and for the monthly parents' meeting. However, trips to a gallery or to a design studio might stimulate interest in those supposedly not gifted youngsters just as much as in those who are. The additional work of making posters or painting scenery may be of little real value except to keep the painters and poster makers busy.

To adults outside the school system, elective classes in art in the senior high school may sound ideally suited for intensive training in art, but such is not the case. The usual art class in high school consists not only of those who are deeply interested in the subject, but also those students who feel that art may be good to take so as not to have to strain their mental abili-

ties, some students whom the school counselor may have prodded into the course to maintain or build up their interest in school, and, of course, the football tackle who is there because he just has to pass some course. The teacher may, therefore, be justifiably more involved in making the course meaningful and stimulating for those who initially lacked interest than in designing it for those with talent.

The course content for both elementary and advanced courses in senior high school is often prescribed by a state syllabus. It has been estimated that only about one-tenth of those entering high school take any elective art courses. Reducing this number further are those who take art for various reasons other than interest, so that the actual number of interested senior high school students in an art program is exceedingly small.

That these students should have a "concentration" of art might be questioned. Some research shows that for the students, environmental factors, past experiences, cultural values, degree of creative ability in specific areas, perceptual sensitivity or patterns, physical coordination, and so forth tend to make the teaching of art a complex matter. This is especially true because the goals of an art program are not easily measured in objective answer form but are seen only in the productive contributions of students years hence. John Michael, in a study of the effect of prizes, and of cubist and abstract paintings, and of examples of other children's work upon the art of high school pupils in Cincinnati, found that each of these influences decreased the aesthetic quality of students' work.²¹ Numerous other studies point out that artistic development is a slow process that is wrapped up in the development of the individual student, his whole pattern of perceiving, creating, and living. There are no easy, quick methods to artistic development.

SUMMARY

Art encompasses a wide range of activities and experiences and the urge to express oneself artistically is both natural and timeless. As each person is different, so is the art of each child and each adult different. Art provides the opportunity to delve into the unknown, to express fantasy and fear, to objectify experiences, and to find directions and answers in the self.

Intelligence tests have little value in predicting art ability, although there is a positive relationship between drawings and intelligence until the age of ten. Studies suggest that the intellectually gifted tend to be critical of

²¹ John Michael, "The Effect of Award, Adult Standard, and Peer Standard Upon Creativeness in Art of High School Pupils," *Research in Art Education*, 9th Yearbook (Kutztown, Pennsylvania: National Art Education Association, 1959), pp. 98-104.

their art products, to be more sensitive, and to have better imagination than the average student.

Some research on creativity indicates the importance of such factors as sensitivity to problems, flexibility, the ability to reorganize or redefine, fluency, and originality. These factors are constantly utilized in art and this may be one of art's biggest assets for the education of the gifted. Art needs an environment which fosters creative growth, an environment in which the teacher is not afraid of experimentation and change. In a stimulating atmosphere each child should be able to pursue his own goals with a variety of art materials.

Identification and training of the artistically talented are complex problems. In the past, too much emphasis has been placed on one factor, the product. The product has been looked upon as the means of finding who is talented, and it has been looked upon as a goal in teaching the talented. In reality, the product is but one factor in a complex involving the person, the process, and the environment. Each of these and their interaction play a part in the training of the artistically talented. In the future, further experimentation and research will help to give some direction, but meanwhile meaningful involvement in creative production can be considered a most worthy goal for all students.

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CHAPTER ELEVEN

Music

ALEXANDER CAPURSO

The education of the musically gifted child has been of importance to scholars and artists since ancient times. At the same time, speculation has been wide regarding the nature of musical talent, its relation to other fields of learning and to general intelligence, and its recognition and measurement.

Today, leaders in education are actively engaged in exploring the means of recognizing talent potential in both the sciences and the arts. Greater attention than ever before is being given by society in general to music and to the nurturing of composers, conductors, and performers. Meanwhile, specialists in psychology and music are continuing in an attempt to describe and measure talent.

What we are saying is that the problem of the musically gifted child can be understood only after understanding has been reached as to the objectives and the meaning of music in America today. The problem is more complex than that of the scientist, for example, whose field can be more readily defined. A brief look at the social implications involving musical ex-

pression is a logical method of approach to understanding the musically gifted child

THE SOCIAL AND EDUCATIONAL IMPLICATIONS OF MUSIC

The Importance of Music in Our Technological Society

In our current search for talent, more and more attention is being focused on finding the best means for educating not only the young potential scientist, engineer, and mathematician but also those who are gifted in the arts and humanities. Many of our leading scientists are themselves giving vigorous support to the notion that the study and understanding of cultural and artistic expressions should be included for balance in the total educational program of science and mathematics students. They recognize that the narrow specialized disciplines which they received in their professional preparation failed to equip them for the necessary awareness and meaning of the human, social, and cultural values in our present civilization. On the other hand, those scientists whose backgrounds have been enriched through the humanities have derived both physical satisfaction and wider understanding of the social implications inherent in their professional endeavors. For these reasons one of the leading professional schools of our nation, the Massachusetts Institute of Technology, has for over a decade supported a program in the fine arts and humanities for its students—the future leaders in science, mathematics, and engineering. In music, for instance, M.I.T. students may participate in musical ensembles and attend courses in music history and appreciation.

Current Musical Interest in America

Much of the present growth in musical interest in our country stems from the impact of the general music education program in our public schools, which has gained in momentum since World War I. Never before in the history of the world has such a large mass of children been given comparable opportunity for education and expression in an extensive range of musical activities. The International Conference sponsored by UNESCO at Brussels in 1953 on "The Role and Place of Music in the Education of Youth and Adults" brought enthusiastic acclaim and envy from the representative musical leaders of other countries because of the quality and vastness of our school music program. Beginning with early childhood years and extending into our institutions of higher learning, our musical culture is being firmly rooted in the youth of this country. Today in nearly every region of the United States, elementary, high school, and college orchestras, bands, and

choral ensembles are endowing the cultural lives of the local communities with enthusiastic and often highly artistic performance.

Technological advancements have also given impetus to society's interest in music. Through the widespread use of radio and television and with the phenomenal rate of sales of high fidelity and stereophonic phonographs and records, our folk music and the music of the masters are rapidly penetrating into many normal channels of our everyday lives. The influence of opera and symphony broadcasts and the television presentations of Leonard Bernstein have brought untold millions in our society closer to understanding and appreciating great music.

ISSUES IN THE EDUCATION OF THE MUSICALLY TALENTED

"Music for every child and every child for music." For years this resounding cliché has symbolized the ultimate goal of music education in our American public schools. The underlying implication of this enthusiastic rallying cry gave assurance that music, too, could contribute to the fulfillment of our democratic educational ideals. Regardless of any existing basic differences among children, the theory has been propounded that every child should have the opportunity to profit from the "enriching experiences" derived through music. Too often, the justification for the importance of music in the total educational structure has been focused upon its alleged sociological and psychological functions while the inherent values of aesthetic experiences through music received scant attention. Furthermore, we have somehow developed the notion that to give music status in a school situation, it must be linked to some current popular educational trend. Consequently, at certain times the music educator boasts that he is "teaching the child rather than music," and at other times he advocates, "teach the child music."

The Meaning and Functions of Musical Experiences

The nature, meaning, and value of music varies from individual to individual. That which is meaningful music to one person may be meaningless to another. Meaningful music depends upon previously established individual and social conditioning, the acquired musical skills and experiences, and the innate capacity to perceive music in its dimensions. For some persons, the capacity for musical experiences is limited to a sensory-motor level. With others the aesthetic experiences will elicit sensory and affective associational responses. Still with some others the experiences will transcend to the level of reflective imagination and intellectual releases although, in such instances, sensory and affective responses also may be involved. The

multi-dimensional facets that shape the musical masterpieces mean that the dynamics of listening has many points of reference. In other words, there are many different satisfying ways of listening to a single important piece of music.

Certain scholars have viewed music primarily as a social art; others have stressed its psychological importance. Psycho-social functions depend largely on the needs and purposes for which the music is desired, and how it is applied: either to satisfy the particular and unique needs of an individual and/or in its interaction to satisfy social life. In either of these situations, music may be conceived as being basically and essentially aesthetic or nonaesthetic in nature and function. The quality of the aesthetic experience which an individual or group derives varies according to the inherent characteristics and meaningfulness of the musical work itself and according to the degree of sensitivity with which people are capable of entering actively into the experience.

A number of underlying forces affect the aesthetic judgments that are placed upon music. They include such factors as, the inherent creative quality of the music itself; the traditional cultural patterns of the epoch in which it was conceived; changes in tastes; its ability to withstand the test of time, the economic and technological conditions that affect patronage and media for communications, that is, radio and television; and the intrinsic, compelling quality of the musical work to absorb the attention of the listener on sensory, emotional, and intellectual levels.

The so-called nonaesthetic music is usually associated with experiences that are more passive in character. Here, supposedly, the music elicits in the listener slight perceptive, intuitive, reflective, or intellectual behavior. The music is enjoyed for purposes of leisure, relaxation, and light entertainment by the individual alone or in social settings dealing with fun and recreation. Frequently in this connection, music is conceived as having extramusical or functional value, particularly when applied to ceremonial occasions of various kinds or as an adjunct to religious worship, work, and therapy.

The Need for Increased Consideration for the Gifted Child

Writers and authorities in the field of music education in the public schools have devoted only limited study to the education of the musically gifted children. As illustration, little more than two printed pages deal with this specific subject in the latest *Music Education Source Book*.¹

However, an encouraging reference is made in this volume to "Excerpts

¹ Hazel Nohavetz Morgan, ed., *Music in American Education, Music Education Source Book Number Two* (Chicago: Music Educators National Conference, 1955), pp. 269-70.

from Resolutions and Recommendations Adopted at the 1953 Division Meetings of the MENC" in which it is stated: "We support an apparent changing emphasis in general education toward increased consideration for the gifted child."² Further brief but significant comments are noted in another section of this book where it is pointed out that gifted children are often neglected by music educators because of their greater concern with average and mentally retarded pupils.

Without questioning the intrinsic philosophy of our American school system, namely, that every child should be afforded an opportunity for educational growth, apparently an increasing awareness is developing among many present-day educators for the need to establish new dimensions in our educational concepts which will stimulate creative and intellectual talents. In dealing with the musically gifted, this means that the teachers must be able to recognize and value talent when it confronts them. Equally important, teachers must either measure up to the responsibility of guiding the development of talent to a fruitful level of performance or channel the talent into capable hands.

The home, even before the school, is involved in the interplay of environmental influences upon the child. The kind of atmosphere which the parents create consciously or unconsciously in the home, their understanding or indifference toward his intellectual interests and artistic aspirations will ultimately contribute either to a series of frustrations or to definitely rewarding experiences in the life of the child.

The intellectual level of the community and its desire for the cultivation of human and artistic values are reflected in the quality of teachers attracted to the school system and in the programs the citizens are willing to foster for the unusually talented pupils. A community that is genuinely interested in the arts will give its gifted children the ever-necessary impetus for higher artistic attainments. Any society that succeeds in producing an environment dedicated to the rewarding of excellence will reap untold profits through the services of the future leaders which they helped to nurture.

THE MUSICALLY GIFTED

Musical giftedness is an inborn capacity which varies in kind and degree. A superior child may be gifted in more than one medium, although unevenly. Thus, a child might possess superior linguistic or literary talent, but the gift of "first-order"³ might be expressed through the medium of art or music. Robert Schumann, for instance, demonstrated true

² *Ibid.*, p. 290.

³ Robert F. DelHaan and Robert J. Havighurst, *Educating Gifted Children* (Chicago: The University of Chicago Press, 1957), pp. 1-14.

literary giftedness in his critical writings, but his *great* gift, as we know, was exemplified through his musical creations. We can say the same of Wagner. Furthermore, as will be discussed in a later section of this chapter, within a single area of expression, such as music, giftedness may be divided into two types: the creative, and the interpretive. Even here we encounter varying degrees of talent traits within an individual although one talent will be of a higher order than the others. To illustrate, a number of famous composers fulfilled the role of distinguished virtuosi performers to the extent that even if they had never written a single composition they would have achieved positions of distinction in the world of music.

Factors Relating to Musical Talent

Musical talent consists of a composite of several musical capacities which give shape and direction to the ultimate medium of expression of the musically gifted. The combination of these various individual capacities determines the nature of the total musical talent. Therefore, the balance of the composite factors determines the nature of the musical expression which is ultimately either predominately creative or predominately interpretive in nature. In other words, the particular talents of performers and conductors are combinations of capacities which create a somewhat different fabric from that of composers, even though all of them share in the complexity of certain similar sensorial capacities. Furthermore, both types of artists possess an intensity of feeling, musical memory, and imagination, but their talents relate themselves into respective channels which are either creative or interpretive.

Creative versus Interpretive Talents. Persons with reproductive-interpretive talent rarely achieve stature as composers, while eminent composers frequently distinguish themselves early in their careers as virtuosi performers. In presenting the reason why so many eminent composers achieve fame as performers, Revesz says: "... any kind of musical training postulates the playing of some instrument, and training in composition and creative activity are scarcely possible without the command of at least one solo instrument."⁴ This can be illustrated by recalling examples of great composers: Bach served extensively as church and court keyboard virtuoso; the child prodigy, Handel, gave harpsichord concerts before the Prussian court; Mozart, among the most famous of the child prodigies, was invited to many capitals in Europe as a virtuoso performer of violin, harpsichord, and organ; Beethoven, to his great distress, was accorded wider acclaim

⁴ G. Revesz, *Introduction to the Psychology of Music*, trans. G. T. C. DeCourcy (Norman: University of Oklahoma Press, 1954), p. 144. Reprinted by permission.

in Vienna as a pianist than as composer; Mendelssohn and Chopin made debuts as pianists at the ages of ten and nine respectively; and other composers such as, Saint-Saëns, Franck, and Rachmaninoff are also recalled as performers.

Even though a composer reveals an outstanding performing gift during early childhood, as remarkable as it may be, it should, nonetheless, be conceived as a distinctly secondary talent which happens to come to the fore prior to the emergence of the creative talent. Possibly this performing gift forms a supplementary musical and psychological preparatory stage which is involved in the embryonic process of creative growth.

Interpretive versus Creative Talents. In contrast to the above, composers can have a combination of creative-interpretive talents, but aptitude for creativity in musical composition is rarely discovered as one of the artistic attributes of distinguished performers. For an explanation of this, we turn again to Revesz who reasons: "Virtuoso performance on any instrument demands such great subordination, such an inward absorption in a composition not one's own, such a degree of self-control, and such specialized technical training, that there is scarcely any energy for the development of a creative gift."²

Although we may agree with Revesz on the expected absence of creativity among artist performers, we may seriously question his points of explanation. Actually the creative process should be considered as a distinctly different type of musical capacity from that which is involved in the interpretive process although the composer may possess virtuosity in performance as a secondary talent trait. It is well known that Liszt, the pianist, Paganini and Ysaye, the violinists, were among the greatest virtuosos of all times, and yet all three attained notable positions as composers despite the multitudinous demands of their concert careers. On the other hand, we should consider that the majority of celebrated performing musicians have not contributed to the art as composers. Among these were the famous conductors, Von Bülow, Nikisch, Toscanini, Koussevitzky, Reiner, and Stokowski; celebrated violinists, Reményi, Joachim, and Heifitz; and pianists, the contemporary Rubinstein and Horowitz. The distinguished reputation achieved by the master interpreter, Casals, centers around his outstanding gifts as cellist and conductor.

Are Physical Structures Related to Giftedness?

How do we recognize the musically gifted child? Does he possess certain unique physical characteristics that enable us to single him out by measuring his height, his weight, the shape of his head, his hands, or his

² G. Revesz, *Introduction to the Psychology of Music*, p. 144.

face? Compared to other children of his own age, would we expect him to possess a strong constitution or to have a somewhat frail and delicate physique?

In more recent years certain investigators have attempted to determine whether any relationship actually exists between gross bodily structure and intelligence. Terman studied these factors, along with other characteristics, in his longitudinal observations of 1,000 gifted children and found:

In physical growth and in general health the gifted group unquestionably rates somewhat above par. There is no shred of evidence to support the widespread opinion that typically the intellectually precocious child is weak, undersized, or nervously unstable. Insofar as the gifted child departs at all from the average on these traits it is pretty certainly in the other direction, but the facts seem to be that his deviation from the norm on physical traits is in most cases very small indeed in comparison with his deviation in intellectual and volitional traits.⁶

No important studies of *musically* gifted children involving height and weight have been made, but probably no investigation of this kind would tell us anything which would contribute significantly to our understanding of musical talent in terms of these physical traits. In fact, we can assume that a study of these physical traits would disclose that the differences found between *master-musicians* would not differ greatly from those found in the general population within any racial group. Consider the wide range of physical differences, for example, between the short, stocky build of Beethoven, the elegant figure of Mendelssohn, and the frail physique of Chopin; Rossini's obesity in sharp contrast to Paganini's cadaverousness; or among present-day musical personalities, the diminutive statures of the pianist Arthur Rubinstein and the violinist Ricci in contrast to the towering frame of the cello virtuoso, Piatigorsky, and that of the young Texas-born pianist, Van Cliburn.

On the other hand, a number of research studies have revealed that gifted children are superior to the average child in the age of walking and talking which undoubtedly have implications relating to musical talent. Early walking might well have a bearing on musical giftedness since neuromuscular coordination plays a part in the acquisition of performing skills. Also, further physiological studies relating to the early manifestation of ability in various performing areas, such as strings, keyboard, woodwinds, brasses, and percussive instruments, would be helpful to our further understanding of the characteristics of the *musically* gifted child.

⁶ Lewis M. Terman, *et al.*, "Mental and Physical Traits of a Thousand Gifted Children," *Genetic Studies of Genius*, Vol. I, p. 634 (Stanford: Stanford University Press, 1925). Reprinted by permission.

Relationship of Intelligence to Musical Giftedness

A popular assumption is that highly gifted musicians possess superior intelligence. This notion is supported by the findings of Dr. Catherine Cox in the significant study she conducted on the early mental traits of 282 geniuses in various fields who were born between 1450 and 1850. On the basis of the biographical material gathered by Dr. Cox and her team of experts, estimated I.Q. ratings were assigned each individual. The corrected I.Q. estimates given certain eminent musicians on the evidence of their behavior and performance in the first period of young manhood are as follows: Gluck, 145; Palestrina, 155; Haydn, 160; Bach, Beethoven, Mendelssohn, Mozart, 165; Handel and Wagner, 170. Obtained and corrected I.Q. estimates for certain groups of the 282 young geniuses who were studied place religious leaders, scientists, and philosophers at the top of the list with corrected I.Q.'s of 170, 175, and 180, respectively. Soldiers received the lowest rating (140) of any of the groups. The estimated corrected mean I.Q. of musicians was 160, while the mean of the total group was 165.⁷

Do the ratings assigned by Dr. Cox for master-composers lead us to conclude that general intelligence is necessarily a trait that is found among all kinds and levels of musical giftedness? Witly qualifies this idea when he comments: "But there are other types of gifted children—children whose performance is consistently remarkable in music, . . . Such children will not always make superior scores on intelligence tests."⁸ Sir Cyril Burt gives support to this view when he asserts that the group factor constituting "musical capacity" is special and distinct from general intelligence.⁹

What appears on the surface as contradictory points of view stated by Cox, on the one hand, and Witly and Burt on the other hand, suggests the following:

1. That the assumed high general intelligence ratings assigned by Dr. Cox would apply only to creative artists of rare eminence, and thus high intelligence does not necessarily occur in other kinds and levels of musical talents.

2. That the conclusions reached by Witly and Burt might not be based on the study and observation of *creative* giftedness in music.

⁷ Catherine M. Cox, *The Early Mental Traits of Three Hundred Geniuses, Genetic Studies of Genius*, Lewis M. Terman, ed. (Stanford: Stanford University Press, 1926). Vol. II, pp. 31-33, 47, Table 12A following p. 60, Table 20B, p. 84.

⁸ Reprinted by permission of the Association for Childhood Education International, 3615 Wisconsin, N.W. Washington 16, D.C. "How to Identify the Gifted," by Paul Witly. From *Childhood Education*, Vol. 29, March 1953, p. 313.

⁹ Cyril Burt, "Grouping Factor Analysis," *Brit. J. Psychol. Stat. Sec.*, Vol. 3 (1950), p. 40.

3. That Witty and Burt's observations of so-called "musical capacity" or giftedness might have involved performers who were strong in technical skills but relatively weak musically.

4. That a "special" quality of intelligence exists which might be called "musical intelligence," describing mental behavior within a musical medium. Perhaps Cox conceives of this as a kind of mental activity that falls essentially within the broad category of general intelligence, whereas Witty and Burt might prefer to consider this a "special capacity" or "musical capacity."

The Creative Musician—the Composer. Intelligence and musical giftedness are definitely related when dealing with musical creativity. Therefore, the estimated high I.Q.'s assigned to the particular composers studied by Dr. Cox and her associates are not surprising if we accept the principle that the creative process in music involves mental activity to the same extent as other creative areas, such as science, mathematics, poetry, philosophy, and invention. Similar to creativity in any field, the composer, when working at his task, deals with a multitude of abstract problems each of which demands a separate solution. As he works with these problems, trying and testing many possible solutions, he finally hits on what to him is the right one. Throughout this series of problem-solving efforts relating to the total creative process, the composer is guided by a directive sense of judgment operating within an integrated scheme of ideational context. Man's use of his intellect to solve problems of an abstract nature involves a high degree of mental activity whether one prefers to deal with tonal or spatial configuration on one hand, or numerical and geometric symbols on the other hand. The intellect is the basic operational essence in all creativity. Probably, this is what the distinguished contemporary composer, Igor Stravinsky, had in mind when on an occasion during World War I he identified himself as "inventor of music" to describe his profession to the custom officers who were stationed at the Spanish-French borders.

The 1950 meeting of the National Education Association in its deliberation on the *Education of the Gifted* gave consideration to this phase of musical and artistic giftedness with the comment:

The essence of the giftedness of musicians, artists, and inventors appears to be creative imagination. In the cases of artists and musicians an additional ingredient is emotional sensitivity. General intelligence also contributes—but just how and to what extent are matters that are not yet well understood.¹⁰

As the above-quoted paragraph notes, giftedness is again mutually related to creative imagination whether we speak of musicians, scientists, or

¹⁰ Educational Policies Commission, *Education of the Gifted* (Washington, D.C.: National Education Association, 1950), p. 37.

inventors. This reinforces the comments made earlier regarding the positive relation of general intelligence to musical creativity.

Occasionally, we encounter further correlative examples of intellectual-musical functioning. During the nineteenth century, a phase of the wave of Russian nationalism reflected itself through the artistic creations of a group known as "The Five." These "intellectuals" were all self-taught musical dilettanti who as composers helped set the stage for a continuous and ever-growing amount of musical creativity in Russia. And yet, with the exception of their leader, Balakirev, the remaining four members of this remarkable group were trained for and worked in professional careers other than music. Borodin was a physician-surgeon who served as assistant professor of chemistry at St. Petersburg Academy of Medicine and later as professor of organic chemistry at St. Petersburg Military Academy. Cui practiced military engineering; Moussorgsky was an army officer; and Rimsky-Korsakov was a much traveled naval officer. Many of their musical works have survived the test of time and continue to be favorites in the orchestral literature and in the ballet theatre. Richard Wagner also comes to mind because of his contributions to phases of intellectual expression beyond the lofty position he attained as high priest of the German opera. We know, in fact, that Wagner's prose writings have affected later aesthetic thinking to a marked extent.

This by no means exhausts possible examples of the multi-intellectual accomplishments of creative artists in music. In more recent times we are reminded of such personalities as the eminent composer-violinist Fritz Kreisler, who throughout his life was a Greek and Latin scholar; the artist-pianist and master teacher, Josef Hofmann, who patented several inventions in the engineering field; and such former career musicians as Godowsky and Mannes, who invented jointly the color film process manufactured by Eastman-Kodak. Finally, in this random list of musicians who distinguished themselves in other fields of intellectual endeavor, we should mention Paderewski who served as Premier of Poland, and Albert Schweitzer, organist, authority on Bach, physician, missionary, and humanist.

The Interpretive Musician—the Performer. The interpreter of music is either a performer on some musical instrument, a singer, or a conductor. His principal function lies in his ability to execute and interpret musical sounds into meaningful artistic expression either as a soloist or as a member of an ensemble. The adequate fulfillment of his task demands certain manipulative skills that are largely dependent upon highly developed neuromuscular coordination. Unlike the composer, the performer is required to demonstrate his artistry directly to an audience. His professional success or failure, first of all, lies in the performing skills he acquires through years of training, practice, and experience. In most instances, this is a conditioning process which begins during early childhood.

The nature of the performing situation may determine the extent to which demands beyond the level of motor skills may involve the artist. Conceivably, under some circumstances it is possible to practice the trade within the restricted limits of mechanical dexterity and at the same time to satisfy the needs of both the performer and the musical situation. To illustrate, a member of the first violin section of a major symphony orchestra, when asked by a college music department head about certain important contemporary pieces played by the orchestra on various occasions, replied that he was seldom aware of the works that were being performed by the group. He elaborated in a boastful but sincere fashion that he had no deep interest in the programming or other artistic affairs of the orchestra—that was the conductor's job; his was to play efficiently the notes placed before him. This violinist was associated with the orchestra for nearly a decade before he decided to accept a teaching post at a university. His tenure there came to an end soon afterwards when his colleagues realized that he had serious shortcomings; his ability as a teacher of violin left much to be desired, and his knowledge of string and chamber music literature was limited. Obviously, intellectual curiosity and insight in musical aesthetics played a limited role in the life of this skillful technician. This illustration raises the question of whether a fluent performer, even upon achieving a level of virtuosity, is necessarily an interpreter of the art.

In a related comment on the relationship of sensory discriminations in music to intelligence, Seashore makes the following point: "The moron may have as keen a sense of pitch as the philosopher. Measurements on children and adults in which pitch discrimination is compared with intelligence show no significant correlation"¹¹

The dazzling technical skills displayed by some performers may represent little more than highly specialized sensory and tactile abilities. Despite these facilities, their performance can fall short of expressing musical understanding and interpretive imagination. This would disclose deficiencies in the complexity of musical group-factors that go into the making of the artist-interpreter. While a sensitive ear and facile technique are certainly important basic factors for musicianship, they do not embrace all of the hierarchy of interrelated musical capacities necessary for full musical expression, any more than the fluent application of syntax in grammar guarantees poetic expression.

The Musical Child Prodigy

The essential characteristics of a true musical prodigy are revealed when the child demonstrates unusually high artistic creativity or originality.

¹¹ Carl E. Seashore, *The Psychology of Music* (New York and London: McGraw-Hill Book Company, Inc., 1938), p. 57. Reprinted by permission.

Creativity or originality may be expressed either through musical compositions—for example, Mozart, the child composer prodigy—or through a rare gift in performance—Mozart again, the child prodigy as a virtuoso performer on harpsichord, violin, and organ. In the case of the performer, creativity or originality is more difficult to identify, for here the prodigy must demonstrate, in addition to high technical virtuosity, a depth of musical knowledge and understanding. This depth of knowledge and understanding is revealed in the quality of his performance and identifies him as an authoritative interpreter—not as a well-coached imitator with brilliant technical skills.

The term "child prodigy" in music is often used loosely, for it always manages to attract the attention of the public and the professional musician alike. Occasionally, we read about or view on the television screen the performance of a preschool child who stands at the piano and plays from memory some tune that he "picked up" somewhere. We might be informed that the "prodigy" has received no formal training in music; in fact, his parents were hitherto unsuspecting that the child possessed this unusual musical gift, although, come to think of it, he had steadfastly evidenced an interest in musical sounds since infancy. Then, again, we may have attended a concert in which some preteenager performed a full program of works and displayed such mastery of virtuoso skills that the audience was left breathless. In such cases, the question is bound to arise whether performances of these kinds actually reveal unusual and essential musical traits that constitute the true "musical prodigy."

Revesz provides us with an answer to this question with this succinct and constructive analysis:

Even when a child's musical performances surpass not only those of his companions but also those of the normally talented adult, this is no indication of an especially marked talent. Neither the unusually rapid development nor the relative supernormality can justify the epithet "prodigy."

The "wonderful" element in the case lies . . . only in the singular creative ability. Consequently the fundamental prerequisite is always the creative formative power, irrespective of whether it takes the direction of productive or reproductive talent.¹²

We find, then, that this analysis throws a somewhat different light on the subject from the one that is facetiously repeated by those who make it a point to mention that certain "musical prodigies" were discovered in some institutions for mentally retarded children. This proves nothing more than the fact that a child's uniquely remarkable ear or motor-performing facility constitute extreme examples of the workings of limited and highly specialized sensory capacities. He will lack, however, the other musical

¹² G. Revesz, *Introduction to the Psychology of Music*, p. 149. Reprinted by permission.

capacities that combine to make the interpretive or creative musician. Furthermore, a strong objection can be raised to the use of the term "musical prodigy" when associated with examples of this kind. It is closer to the truth to label such phenomena as "robots in music."

General Attributes of the Musically Gifted Child

Instead of narrowing our attention to the rare phenomenon of the prodigy in our study of musical giftedness, we must seek to increase our understanding by viewing the various composite capacities that constitute the talented interpreter-performer, conductor, or composer. The musically gifted child, the future artist, unquestionably, must be endowed by nature with an unusually high motor-sensory capacity. This is basic equipment for the acquisition of the performing skills required for artistic expression. Certainly he must possess an acute native auditory sense to enable him to perceive fine differences in the various characteristics of a musical tone, such as pitch, loudness, timbre, and duration. These separate sensory capacities in themselves, however, do not describe the composite musicality of a gifted child. Teachers and musicians frequently make reference to "musical instinct" or "musical feeling" when a performer exhibits a certain artistic, interpretive quality which displays something more than an exhibition of accurate technique. This "something more" should actually be termed "musical intelligence." It is unlike general intelligence only to the extent that its frame of reference is musically oriented and the mental activity is directed solely toward the seeking of musical goals.

Psychologists describe general intelligence as the process of relating individual behavior to various situations in life. These include how he learns, his ability to solve problems of various kinds, his ability to recall (memory) and to utilize past experiences in present situations, his ability to relate ideas, and finally his ability to make the right choice from many possible choices (judgment). Similarly, "musical intelligence" may be considered as describing a composite musical behavior which deals with learned skills and tonal imagery and the ability to solve problems of technical and cognitive nature involving tonal patterns. For example, musical intelligence may include: the moulding of a phrase so as to make it musically meaningful; the ability to recall previously learned tonal images and previously absorbed emotional experiences associated with musical structure and aesthetic content; the ability to find relationship in style, form and content; and finally, the ability to make correct choices guided by reflective aesthetic judgment in order to build up a complete, coherent, and convincing musical whole. According to Seashore.

Intelligence is musical when its background is a storehouse of musical knowledge, a *dynamo of musical interests*, an *outlet in musical tastes*, and a warmth of musical experiences and responses. Here, as in the case of imagination, the type and the degree of intelligence may characterize or set limits for musical achievement. The great composer, the great conductor, the great interpreter live in large intellectual movements. . . . At the other extreme are the various kinds of small musicianships in which reflective thinking does not function; the experience and the performance are on a sensorimotor level.¹³

All of the preceding discussion relating to the subject of general intelligence, musical intelligence, and sensory-motor skills, gives the behavioristic aspects that constitute musical giftedness. These are the factors that *describe and identify the musically gifted child*.

The Emergence of Musical Giftedness

Researchers generally accept as fact that the talents of musically gifted children are usually revealed during early childhood. In 1922, Haecker and Ziehen conducted a study relating to the emergence of musical talent.¹⁴ They investigated a total of 441 subjects varying in ages from under two years and extending beyond twenty years. Only three of these subjects (males) were in this latter category. The investigators found that nearly 50 per cent of the subjects disclosed musical giftedness before six years of age. Furthermore, talent emerged in 83.4 per cent of the boys and 90.4 per cent of the girls before their tenth year. Utilizing the data from Haecker and Ziehen's study, Revesz charted the distribution of the age range into groupings of five-year periods as follows:

TABLE I
Musical Aptitude of Children and Adolescents¹⁵

	2 to 5	6 to 10	11 to 15	16 to 20	Total
Boys	131 46.1%	106 37.3%	38 13.4%	9 3.2%	284
Girls	74 47.1%	68 43.3%	13 8.3%	2 1.3%	157

From this data, Revesz concludes: "On the basis of this investigation it can be stated that musical aptitude of boys and girls usually betrays itself

¹³ Carl E. Seashore, *Psychology of Music*, p. 8. Reprinted by permission.

¹⁴ V. Haecker—Th. Ziehen, "Zur Vererbung und Entwicklung der musikalischen Begabung" (Leipzig: Barth, 1923).

¹⁵ G. Revesz, *Introduction to the Psychology of Music*, p. 170. Reprinted by permission of University of Oklahoma Press.

unmistakably in various utterances and performances before the beginning of puberty."¹⁶

Admittedly, while the research by Haecker and Ziehen has too few cases for statistical validity, it is, nevertheless, of value to the extent that it suggests that musical giftedness does reveal itself at an early age.

In another study Sward confirmed these observations by using data prepared from program notes of the New York Philharmonic, and Boston, Chicago, and Philadelphia symphony orchestras as follows:

Tuition under a master-teacher or in an important conservatory was under way at the following ages for various artists. At 3, Rubenstein, at 5, Heifetz; at 6, Barth, Schelling, and Schnabel; at 7, Enesco, Huberman, Levitzki, and Spalding; at 8, Burgin, Hofmann, Kindler, Lhévinne, Rosenthal, and Vescey; at 9, Kochanski, Moiseiwitsch, Stravinski, and Zimbalist; at 10, Casella, Elman, Flesch, Ganz, Grainger, Godowsky, and Ornstein; at 12, Bartók, Casals, Dunshkin, Paderewski, Prokofieff, Salmond, and Siloti; at 13, Copland, Gordon, Iurbi, Poliakín, Shattuck, Szigeti, and Thibaud; at 14, Culberston, Horowitz, Lamond, Sanromá, and Zeechi; at 15, Samuel and Piatigorsky; at 16, Gabrilowitsch, Gieseking, and Mischakoff. Competent teaching began even earlier than the figures indicate because in many cases the reported ages are for the debut or graduation from the conservatory.¹⁷

Further readings concerning other great musicians will substantiate the findings given here, with the exception of a few masters such as Berlioz, Tsehaikowsky, and Wagner, most of the great musicians revealed their artistic gifts before their teen years.

IDENTIFICATION AND MEASUREMENT OF MUSICAL TALENT

Early Studies of Musical Talent

As yet, no one has succeeded in measuring the total configuration which we call musicality. Psychologists have applied indirect means for measuring intelligence by noting how an intelligent person is supposed to behave under certain situations. Likewise, in dealing with the measurement of musical talent, we arrive at certain deductions based on observations of gifted individuals. The external musical symptoms they reveal are supposed then to indicate traits that we believe go into the making of musical talent. Among the earliest investigators who recorded the elements of musical talent was a Viennese physician, Dr. Biloeth.¹⁸ In his publication of 1896,

¹⁶ *Ibid.*, p. 170. Reprinted by permission.

¹⁷ Keith Sward, "Jewish Musicality in America," *Journal of Applied Psychology*, James P. Porter, ed. (Indianapolis, Indiana: E. E. Pauley & Company, Inc., 1933), Vol. 17, 1933, p. 700. Reprinted by permission of the American Psychological Association.

¹⁸ Th. Biloeth, *Wer ist musikalisch?* (Berlin, 1896).

he advanced the notion that musically gifted persons have the ability to recognize, retain, and reproduce melodic and rhythmic phrases. Other researchers who pioneered in this field of investigation arrived at more or less the same basic conclusions. Wundt,¹⁹ Stumpf²⁰ and Rupp²¹ agreed in general that a talented individual has a highly developed musical ear, a strong sense of pitch, and a musical memory that enables him to retain and reproduce vocally and instrumentally successions of tones and intervals.

Revesz probably made the most thorough study of any investigator in this field. For a period of about eight years he observed a highly gifted child named Erwin Nyiregyhazi whose musical traits he describes in *The Psychology of a Music Prodigy*.²² Revesz noted that by the time the child was five years old he was able to reproduce melodies he had heard as well as to compose original melodies with piano accompaniment. At age seven, Erwin revealed that he was the possessor of absolute pitch. He could identify the names of successions of tones, intervals, and chords that were played at the piano or on woodwind or string instruments. Also at this age, Erwin was able to improvise, compose, and transpose music into any key. He possessed an exceptional ability in the recognition and analysis of interval and chordal structures. Regarding his musical memory at this time, Revesz comments on the fact that Erwin was shown a thirty-three measure theme written for piano which he was asked to scan visually without playing it at the piano. After a little more than six minutes the child was able to perform the work from memory and without error. Erwin's remarkable power of retentivity was further shown when after a lapse of two years it was found that he could perform and write the notes of this entire theme without any errors.

On the basis of his observations of Erwin, and as a result of other studies on musical giftedness, Revesz concludes in a later book, *Introduction to the Psychology of Music*, that there are two levels of musicality, namely, "the lower" and "the higher." The former, according to him, is measured by tests on regional pitch, rhythmic sensitivity, and the ability to sing a melodic line. For the "higher levels of musicality," he would measure relative pitch, harmonic recognition, ability to play melodies from memory, and the demonstration of a creative fantasy.²³

¹⁹ W. Wundt, *Grundzüge der Physiologischen Psychologie* (Leipzig, 1910).

²⁰ C. Stumpf, "Akustische Versuche mit Pepito Areola," *Ztsch. f. ang. Psychol.*, Vol. 21 (1909), pp. 1-11.

²¹ H. Rupp, "Ueber die Prüfung musikalischer Fähigkeiten," *Ztsch. f. ang. Psychol.*, Vol. 9 (1919), pp. 1-76.

²² G. Revesz, *The Psychology of a Musical Prodigy* (New York: Harcourt Brace, 1925).

²³ G. Revesz, *Introduction to the Psychology of Music*, pp. 131-140.

Seashore Measures of Musical Talent--A Standardized Musical Aptitude Test

As part of the general trend, which was established around the time of World War I, of devising objective standardized tests for measuring mental behavior, several investigators became interested in the development of tests for the measurement of musical aptitudes. Carl E. Seashore was among the pioneers to conduct intensive investigations along these lines. As a result of his efforts, the first test battery on music was issued in 1919. During subsequent years, researchers in this field of investigation have established other tests which contain variations and inclusions of certain items not previously measured, but, in the main, most of them deal more or less with the musical factors that were measured originally by Seashore.

The 1919 edition of the Seashore battery is known as the "Measure of Musical Talent."²⁴ It measures six separate capacities, which the author believed were fundamental in assessing the sensory capacities that constitute musical talent. However, in 1939 he changed one of the original six items by substituting the test on timbre for the one on consonance. He made other minor revisions including the substitution of the term "loudness" instead of "intensity" and improved upon the quality of the reproduction of the musical stimuli. The later revision measures the capacity for perceiving differences in *pitch, loudness, rhythm, time, timbre, and tonal memory.*²⁵ A long-playing recording of the Seashore Measures was issued in 1957 by the Psychological Corporation. This makes it possible to include all six test items on two sides of a single disc.²⁶ Other than improving upon the fidelity of reproduction and making minor changes for administering the test, no other changes occur in the latest revision. The interpretation of the results are still based on the norms which were established for the earlier edition.

Validity of the Seashore Measures. Regarding the validity of the measures, the question is raised frequently as to whether the test battery actually measures musical behavior. On this, Seashore expresses his own views:

. . . [measures of musical talents] have been validated for what they purport to measure When we have measured the sense of pitch, i.e. pitch discrimination, in the laboratory with high reliability and we know that pitch was isolated from all other factors, no scientist will question but that we have measured pitch. . . .

²⁴ C. E. Seashore, *Manual of Instructions and Interpretations for Measures of Musical Talent* (New York: Columbia Graphophone, 1919)

²⁵ Joseph G. Suetterl, D. Lewis, and C. E. Seashore, "Revision of the Seashore Measures of Musical Talents," *Univ. of Iowa Stud. Anim. Progr. Res.*, no. 65 (Iowa City: University of Iowa Press, 1949)

²⁶ *Seashore Measures of Musical Talents*. Long-Playing Recording (New York: The Psychological Corporation, 1957)

Validations of pitch against the violinist's artistic performance in the actual musical situation would require that we correlate the sense of pitch with objective records of musical performance in *pitch intonation* or ability to hear *artistic pitch deviation* in the musical situation—not with the countless other merits or demerits that the violinist may exhibit. . . .²⁷

As a related aspect of the validation of the Seashore Measures, investigators have given more attention to this battery of tests than to any other standardized music tests. Numerous studies have been conducted to ascertain whether scores on the Seashore tests would serve as basis for prediction on: (a) achievement test scores in musical notation;²⁸ (b) success in ear-training classes;²⁹ (c) certain academic grades of college music students;³⁰ (d) grades in music theory;³¹ grades in music appreciation;³² (e) success in instrumental performance;³³ and, (f) for the selection of music students in conservatories and colleges.³⁴ In general, these studies and others conducted along these lines disclose that Seashore measures do have varying degrees of validity.

Reliability of the Seashore Measures. Regarding the reliability (consistency) of the six tests included in the Seashore Measure, statistical analysis has been made for each test at various grade levels. Findings reveal that the coefficient of reliability varies in the group norms from relatively low scores to relatively high scores.³⁵ This raises the question of whether training plays a part in effecting improvements in test scores. This point has not yet been completely settled although studies con-

²⁷ Carl E. Seashore, "The Psychology of Music," *Music Educators Journal*, Vol. 24, December 1937, pp. 25-26.

²⁸ S. E. Farnum, *Manual for the Farnum Music Notation Test* (New York: The Psychological Corporation, 1953).

²⁹ W. H. Lichte, "The Seashore Measures As Predictions of Success in Ear-Training Classes," *American Psychologist*, Vol. 7, October 1952, p. 591.

³⁰ W. E. Wilson, "Use of the Seashore Measures of Musical Talents in the Prediction of Certain Academic Grades for Music Students at the Pennsylvania State College" (Master's thesis, Pennsylvania State University, 1950).

³¹ W. S. Larson, "Practical Experience in Music Tests," *Music Education Journal*, Vol. 24, March 1938, p. 31.

³² J. McLeish, "The Validation of Seashore's Measures of Musical Talent by Factorial Methods," *Brit. J. Psychol., Stat. Sect.*, Vol. 3 (1950), pp. 129-140.

³³ H. C. Manor, "A Study in Prognosis: The Guidance Value of Selected Measures of Musical Aptitude, Intelligence, Persistence, and Achievement in Tonette and Adoption Classes for Prospective Instrumental Students," *Journal of Educational Psychology*, January 1950, Vol. 41, pp. 31-50.

³⁴ Hazel M. Stanton, *Measurement of Musical Talent: The Eastman Experiment*, *Univ. of Iowa Stud. Psychol. Music*, Vol. 2 (Iowa City: University of Iowa Press, 1935).

³⁵ Carl E. Seashore, Don Lewis, and Joseph G. Saevelt, *Seashore Measures of Musical Talents Manual*, Revised by the Test Division Staff, The Psychol. Corp. (New York: Psychological Corp., 1956).

ducted by such investigators as Wyatt³⁶ and Capurso³⁷ and several others tend to demonstrate the fact that scores on pitch sensitivity improved appreciably with training. Farnsworth concludes from this:

. . . it seems safe to assume that the effects of pitch training on ability are rather basic. It might, of course, be added that even if sensitivity changes had not been demonstrated so dramatically there would still be no reason to suppose that training methods developed later might not be effective.³⁸

Influences of Heredity and Environment on Test Scores

The above observation on the improbability of pitch and possibly other sensory measurements in music raises the broad question of whether capacities are actually biologically predetermined and therefore innate, or whether environmental factors are significantly related to innate capacities in the fullest expression of these traits. While we do not at this time intend to discuss the subject at any real length, we may state in passing that neither heredity nor environment acts alone in the development of the artist. Today, social scientists generally agree that all human traits, the physical, psychological, and social, result from the interaction between hereditary and environmental influences. For this reason, we do not always know when and to what extent a so-called aptitude test also measures achievement, be it a test of general intelligence or of some musical capacity.

General Statements on the Testing of Musical Aptitudes

We may make these conclusions regarding the limitations, uses, and value of standardized tests of musical talent:

1. In the main these tests measure the various separated sensory factors involved in the perception and discrimination of musical sounds, that is, pitch, loudness, rhythm, timbre, durations, and memory. Usually, these stimuli consist of isolated tones or a series of tones rather than musical phrases or sections which in reality embody the whole configuration of music, for example, melody, rhythm, harmony, orchestration, and the like. Therefore, up to the present time the practice of constructing standardized tests in music has not progressed much beyond the approach used by the

³⁶ R. F. Wyatt, *Improvability of Pitch Discrimination*, *Psychol Monog*, Vol. 58, no. 2 (1945).

³⁷ Alexander A. Capurso, "The Effect of an Associative Technique in Teaching Pitch and Interval Discrimination," *Journal of Applied Psychology*, Vol. 18, December 1934, pp. 811-818.

³⁸ P. R. Farnsworth, *The Social Psychology of Music* (New York: The Dryden Press, Inc., 1958), p. 186. Reprinted by permission.

German experimental psychologists of the late nineteenth century as Wundt and Fechner. Such scientists pioneered in the measurement of the psychophysiological responses applying isolated and simple stimuli in the study of sensations, in auditory, visual, and kinesthetic fields.

2. The Seashore test battery measures ranges of tonal acuity and discrimination that extend far beyond the level which is normally used in actual musical situations. This leads to confusion and criticism regarding whether the determined percentile ratings achieved by students have practical application for their selection and guidance into certain specific areas of music study. For instance, should a student who places in the fiftieth or sixtieth percentile on the the pitch test be encouraged to undertake the serious study of some string or wind instrument?

An aspect of this question became a topic of interest and discussion by a group of educators who in deliberating on the education of the gifted had this to say about predicting musical talent:

Thus, on the best of musical aptitude tests a child whose score places him in the lowest 10 per cent of the population is quite certain never to become an accomplished musician. But it is not possible to predict with assurance that a child who places within the top 10 per cent—or even the top one per cent—on the same test will develop high proficiency in music.²⁹

3. On the basis of evidence collected on the Seashore Measures and on certain other music tests having reasonable validity and reliability, we may assume, however, that such tests do have practical value when used in conjunction with other vital data. Under these conditions the test of musical talent becomes an important objective index when it is supplemented by intelligence tests, personality scores, school grades, and the judgments of qualified teacher-musician observers. Cumulative data such as these (when properly interpreted) have been found to have considerable value for prognostic and diagnostic purposes in the guidance and training of children in music.

4. Neither aptitude tests in music nor any other objective tests on mental behavior deal directly with the factor of motivation (drive). Since success in music as a career demands the acquisition of highly developed skills and musical knowledge, which require years of persevering practice and study, insight into the motivational behavior of the child is as important as are aptitude tests scores.

5. On the basis of the few longitudinal studies made by observers of highly musically gifted children, the factor of tonal memory appears to be the most consistent single important characteristic relating to musicality. Additional confirmation is gained from the research study by Baumgarten,

²⁹ Educational Policies Commission, *Education of the Gifted*, p. 38.

of Gebhardt, the "wonder child in music." This investigator concludes that the secret to the child's musical genius had its roots in a remarkable musical memory.⁴⁰ Memory and retentivity are basically important attributes for both the reproductive-interpretive musician and the composer. In fact, the "red vein" appears to predominate in any of the cognitive processes even outside of music. The capacity to retain and recall is essential for creative scientists, philosophers, inventors, and musicians; they must be able to integrate and interpret previously established associations to create new relationships. For the composer, tonal memory constitutes the musical repository upon which he draws profusely, consciously or subconsciously, for the formulation of new aesthetic patterns in the creation of his own art expression.

FACTORS RELATING TO THE EDUCATION OF THE MUSICALLY GIFTED CHILD

If the artistic education of the musically gifted child is to be effective, it must begin in the home and in the elementary grades of our public schools. Music educators are thus faced with the challenge of re-examining their professional objectives, functions, and responsibilities in the light of the present general concern regarding the efficacy of our entire educational system.

Educational Problems in Identifying and Assessing Musical Talent

Early Musical Symptoms. In many cases the potentialities of gifted children have been recognized either too late or not at all, or they have been misjudged. Theoretically, the education of the child gifted in music should begin when his talent is first recognized. Musical talent may first be revealed during early childhood by strong curiosity and sustained interest accompanied by the desire to create musical sounds through some particular means of expression. The expressive drive need not necessarily be evidenced through the actual performance on a musical instrument or in singing. It may be revealed by motor and bodily movements which are triggered off by the music the child hears. He may respond to the rhythms and tempi of the music, or to variations in volume, as well as to vocal and/or instrumental "tone-colors." These early physiological accompaniments to musical sounds disclose the fact that music has an appeal to the child, but they should not necessarily lead us to conclude with certainty that the child has musical giftedness.

⁴⁰ F. Baumgarten, "Der Werdegang eines Wunderkindes nebst einem Bericht über die Beziehung des Gedächtnisses zur Begabung," *Z. Angew. Psychol.* Vol. 41 (1932), pp. 473-98.

The Part the Parents Play. The child who is gifted in music may be ready for musical guidance and instruction at a preschool age. The parents at this time are the immediate and most critical point of influence in establishing the kind of environment that will encourage and direct the child in his musical development. Because the musical child himself cannot be fully aware of any outstanding gift he may possess, despite his strong attraction to music, the responsibility of seeking the means for the proper evaluation of the talent and the direction and medium for its expression lies with his parents. The problems which they face are not only to recognize whether strong potential talent actually exists, but also to control their own expectations and aspirations for the child's future artistic goals and achievements. The difficulties involved in the identification and assessment of musical giftedness in the young child by parents have also been observed by other investigators. On this point, Stanton makes the following comment:

Parents generally lack the experience necessary to identify musical ability; some are biased by "halos" and social values associated with any abilities of their own children; some are so talented themselves that they do not heed the evidences of unusual ability in their child; others oppose and suppress talents in their children which are not harmonious with parental plans, especially is this true for musically gifted boys.⁴¹

The Part the School and the Community Play. The importance of the recognition of talent should not be ignored during the early years of the child. However, unless recognition is followed by proper subsequent guidance and effective education, we risk the danger of creating serious emotional, school, and social problems. Neither the most loving parents, nor the most interested classroom teachers, nor the most enthusiastic support of a community—important as these contributing influences may be—will take the place of the expert judge who has specialized knowledge of the demands required for the creation of music and the development of the musician. The outcome of giftedness in music can be measured and judged only in terms of its own characteristic attributes. Primarily its pattern of education involves artistic values as well as the values placed by a society on education.

Misjudging musical talent is as serious as failing to recognize it. Oftentimes we learn about some well-meaning patron of the arts, with a sincere sense of community pride and a zeal to help "musical genius," creating instead untold embarrassment to himself and lasting unhappiness to his not so gifted protégé. As illustration, there was an individual of mediocre singing talent who was given financial backing by a civic club to enable her to go to a large city to study with a big name artist-teacher in preparation

⁴¹ Hazel M. Stanton, "The Gifted Child in Music," *Journal of Educational Sociology*, Vol. 10, October 1936, p. 75. Reprinted by permission.

for a concert and operatic career. Two years later the money had vanished and the young person had little to show for her efforts and artistic ambitions. In addition, she could not face returning home a failure.

Emergence and Distribution of Diverse Talents. It is relatively easy to formulate impressions, through hindsight, that musical giftedness is usually revealed during the early years of childhood and to substantiate this view with listings of famous prodigies. However, in the study of musical and other talents, results show that the high school years provide a much more promising period for making accurate measurements of artistic, intellectual, and educational growth and development. At this age level we discover with greater certainty the general and specific strengths and weaknesses of the individual. Then, also, many of the latent talents emerge and enable more complete assessment and precise differentiations in the weighing of the relative strengths of the various abilities. This fact can be illustrated by Wagner's post-adolescent manifestation of a creative gift in music which superseded his literary talent.

In considering the educational program of the gifted child in music, we are apt to be confronted with both the problem of the identification of the musical talent as well as with the assessment of this talent against possible strong capacities in other fields. Assuming that the degree of musicality revealed by the child is sufficiently marked and that he has evidenced continued interest in its development, the question of whether the musical talent will continue to predominate appreciably over any of the other possible strong talents that emerge remains a difficult one to answer. In fact, even during the late high school years in many instances the superior students are unable to decide on the particular career they wish to follow. Even more regrettably, we find that this indecision often carries over into the later years of study in colleges or professional schools. At this level we frequently encounter students of high intelligence with well-defined musical giftedness and excellent musical training who transfer into other areas of learning. Some of the talented students with outstanding records of achievement may transfer from the school of music to one of the many other departments of the university. On the other hand, we are frequently approached for admission into music by gifted students who had been enrolled in undergraduate programs in other fields of study.

These illustrations emphasize the importance and the complexity of the problem of the identification and appraisal of musical giftedness and the persisting need for wise and effective guidance by parents and teachers. Since creative talent in music is believed to be highly correlated with general intelligence, we are apt, for this very reason, to be misled in our judgment by not guiding the child into the course for which he is best endowed by nature.

Primary Influences and Patterns for the Education of the Musically Gifted

Differences in the Educational Background of Certain Master-Musicians. In writing about the early musical training of some of the famous European virtuosi performers of recent generations, Sward makes the following observation:

Escape from the formal school system has something to do with the profession of European, incidentally Jewish European, musical artists. An impressive number of our virtuosi were infant prodigies who were placed very early under master pedagogues and in great conservatories. The precocity is not underestimated, but the early tuition of high calibre is equally important.⁴²

The above quotation gives the impression that the young gifted musicians had to "escape from" the normal pattern of general education which was provided during their day in European countries. Are we to assume from Sward's statement that the musical masters of past generations were discouraged from acquiring a general education because such knowledge was considered of little relative value in music? Certainly we might single out such personalities as Paganini, and perhaps others, and say that such men became highly successful artists without the advantage of much formal schooling. This does not necessarily mean that Paganini, for example, preferred to avoid opportunities for broader education. In this particular case we find that Paganini's educational development was neglected primarily because of his father's obsessive drive for his son to earn for him a quick fortune through his musical gift. Such child musicians often were driven to expend an inordinate amount of time in the practice of music at the sacrifice of broader learning.

Conversely, we recall many illustrations of famous musicians who received broad educational opportunities which ran concurrently with intensive training in the various phases of musical disciplines, including the practice of one or more instruments and the study of theory and composition. Bach, for instance, spent ten years as a student at a *Gymnasium* from which he graduated at the age of eighteen. Handel, Schumann, and Sibelius attended universities as law students for varying periods. Tschai-kowsky served as a clerk in the Ministry of Justice. Schubert attended a normal school in order to prepare for the teaching profession. Mendelssohn was raised in a home environment of opulence and rich culture. His parents were able to provide for him a liberal, classical education through the hiring of tutors. Schumann, too, had the advantage of growing up in an

⁴² Keith Sward, "Jewish Musicality in America," *The Journal of Applied Psychology*, Vol. 17 (1933), p. 700. Reprinted by permission of the American Psychological Association.

atmosphere of learning under the influence of his father who was a learned bookseller and publisher. Many composers in earlier eras, extending into the Renaissance and before, were either learned clergymen or artists who were liberally educated by the church. Through the sponsorship of the church, musically gifted children received carefully organized and well-rounded training. Later, this tradition was carried into the Lutheran schools because Luther himself was a skilled musician and talented composer who recognized the value of musical experiences as an important aspect of general education. He insisted that the teachers he engaged for his elementary schools be skilled in the musical discipline.

Although we do observe that certain musical artists of the past were deprived for one reason or another from broadening their education beyond rigid specialized studies, this does not reflect the actual pattern in most cases. A study of the eminent musicians of the Renaissance and Baroque epochs will disclose that these men were indeed educated according to the highest concepts of the classical learning of their respective periods. Even today, in certain European countries a musically gifted child receives musical training in the hands of master-teachers, privately or at conservatories, but not to the exclusion of his general education.

Present-day Need of General Education. The education of the musically gifted child is fundamentally related to the education of all gifted children in our contemporary American society. Less than a century ago a person was considered educated if he knew Greek, Latin, philosophy, and mathematics and had enough specialized training to qualify him as a teacher, lawyer, physician, or clergyman. Since that time we have experienced a continuous series of experiments and changes in our educational philosophy. Our life now is guided by a social philosophy which seeks satisfactions through immediate material, physical, and economic wants. To produce the specialists to meet society's wants, our educational pattern has moved in the direction of too much specialization with too many short-cuts. How best to build a general and broad background of educational experiences and at the same time to provide the musically gifted child with enough specific and practical knowledge and skills in the area of his specialized talent is the question yet to be answered satisfactorily.

The Teacher As An Influence. Those who are entrusted with the responsibility of educating musically gifted students are presently confronted with the question: What curriculums should we devise which will make them more effective artists and citizens in our complex national and world society? We are becoming increasingly aware that in the education of the artist-musician of today we can no longer follow the traditional pattern of the conservatories which were founded on the cultures of a distant land and of a past century. The narrow, specialized curricular offerings of a "Leipzig Conservatory" type of the nineteenth century is no longer ade-

quate in scope to prepare our modern students in America to meet today's social conditions.

Technological and socio-economic changes have affected the art and the artists in ways that were undreamed of even at the turn of the century. Radio and television have to a great extent replaced the concert halls. Our present social-economic structure has altered the character of the patron-supporters of the arts. These contemporary social forces even affect the style and forms that are created by the composer. As a product of his time and place, the composer is moved to adjust to the changing conditions in several different ways. He, consciously or subconsciously, reflects the temper of his epoch. The composer is compelled to shape his creative efforts into the forms in which they will stand a chance of receiving public performance by soloists and ensembles. He realizes that the possibility of having an opera produced that involves a huge cast is unlikely because of the tremendous expense that is involved as well as the limited number of opera companies that are in existence. A short chamber opera is more likely to be performed in a theatre, on television, or in a school setting. At a glance these are a few of the more apparent social factors that should be taken into account in the general and artistic education of the future musician.

Even in 1907, Frederick S. Converse must have sensed some of these and possibly other concerns in the education of young music students when at the annual convention of the Music Teachers National Association he admonished its members to consider the following:

Teach him the kindred beauties of literature, of painting, of sculpture, give him respect for the thoroughness and exactness of science, the broadening influence of political and social history, the logical deductions of philosophy, the pitiless competition of economic forces, the glowing imaginative flights of poets and dreamers of all ages, the enthusiasms of religions, new and old, and insist upon a comprehensive knowledge of the history of his own art from its earliest sources, distant and dim, in Egypt, Persia, and Greece, through its various important windings and ramifications down to our present day.⁴³

The implied and self-contained aura which the musically gifted child frequently associates with his major teachers reflects the extent of their influences upon the child's views on life. The emphatic intimacy of their relationship, more so in the individualized music studio situation, is such that the teacher is admired by the child as a symbol of attainment, whose attitudes, manners, enthusiasms, and ideals become emotionally involved in the child's ego identification. The breadth of the expressed intellectual

⁴³ Frederick S. Converse, "What May the University Do for the Composer?" *Music Teachers' National Association, Volume of Proceedings for 1907* Vol. 2 (Pittsburgh: Published by the Association, 1907), pp. 246-47.

interests of the teacher often reflects and formulates the child's own view of the world extending beyond the sphere of music.

Types of Teachers That Are Needed for Balance. We have discussed briefly the influence of one type of teacher upon the gifted child—the artist-musician. Ideally, the child should have contact with two types of teacher: the *artist-musician* and the *scholar*. This leads us now to the viewing of the child within both the individual studio and the classroom situation. By this we mean that supplementary and concurrent educational contact is established that extends beyond the area of professional specialization involved in the acquisition of performing and/or musical skills. The respective qualities of these two types of teachers may be utterly unlike, but they will complement one another so fruitfully that the education of the gifted students will be rounded and complete.

The artist-teacher is the composer or the performer in some specialized field. We assume that he is first of all a creative or performing artist who possesses a sincere enthusiasm and interest in teaching. We would list the qualities of the artist-teacher as follows: (1) professional competence through mastery of his art; (2) professional accomplishment through creative production or performance as evidenced in public concerts, notices, and honors in musical circles; (3) professional integrity through maintaining artistic standards above any compromise, community and educationalists notwithstanding; (4) personal qualities—human sensitivity, energy, and conviction; (5) intellectual qualities—an investigating and reflective mind which is at once logical and intuitive.

The scholar-teacher should first of all be a humanist, engaged in the comparative studies which enable him to know more about literature, philosophy, art, psychology, and education than the specialists in these fields know about music. Beyond this, his qualifications may be judged according to the conventional criteria, e.g., research and publications.

The intellectual, aesthetic, and musical contacts that are established with teachers who fall into these two broad categories are consistent with the basic tenet of providing the most effective dual type of educational program for the musically gifted child. We must be assured that he receives a well-rounded academic background combined with the specific specialized requirements for his musical development. These vital, broad, and fundamental educational influences should illuminate and shape the child's artistic and mental growth not only throughout his elementary and secondary school years, but also throughout his education after high school.

Basic Educational Patterns. The critical point of concern at this moment is whether our present public school structure is organized and geared to stimulate gifted children in any area. Certainly we need to recognize that this involves not only careful programming of courses and activities, but also the selection of teachers with superior intellectual qualities who

understand the problems that are inherent in the development of musically superior children. We must face the fact that school programs which are primarily geared for average children cannot serve adequately the needs of the mentally gifted.

This brings us to the question of whether this challenge could be met by establishing separate special public schools to meet the needs of the different groups of superior children. Several years ago the New York City High School of Music and Art was established for gifted students in the arts. Consistent with the underlying educational philosophy of other special schools, all of the students receive a broad academic education along with specialized training in their respective major area. Alexander Richter, the chairman of the music department, sums up the nature of the education and exploratory experiences which the musically gifted child receives at his school:

... his musical training in the high school should be broad, penetrating, and fundamental, not a specializing one. There is time for that after graduation. Let him first develop thoroughly his basic sense of rhythm, melody, pitch relationships, form, and harmony. Let him create his own compositions so that he will better understand the processes of the masters. Let him transpose, read at sight, improvise, accompany, and play in ensemble. Let him sing in choruses and let him orchestrate and conduct. Above all, let him explore music for himself so that he may analyze himself and find himself in music. Perhaps he had better not prepare for teaching but is more suited by temperament for public performance, or vice versa. Perhaps he is suited to writing, publishing, or criticizing. Let him try his wings.⁴⁴

Even within the framework of such a dually structured program of general and specialized education, such as conceived at the High School of Music and Art, some educators question the concept of segregating gifted children according to their diversified talents. They stress the point that the gifted child in music might possess other and even stronger talent traits than those which he has already revealed in music. If other latent capacities exist, they might emerge during the high school years or even later, thus causing serious changes in vocational planning. Furthermore, this group of educators contends that the child should be given continuous opportunity to come in contact with superior children in other areas of interest, as well as with those of average capabilities. This point of view has significant sociological and psychological merits. Regardless of the concern for the fullest development of the child's musical gifts, his artistic success should not be

⁴⁴ Alexander Richter, "The High School of Music and Art: A Program of Education for the Gifted Child," *Music Teachers National Association Proceedings* (Pittsburgh: Published by the Association), Vol. 33 (1938), p. 252.

attained at the sacrifice of a balanced personality. Earl McGrath brought this point to the attention of conservatory and college music school administrators at their 1958 annual convention with the following remarks:

There is a common fear that a professional group will lose its identity by permitting its students to be intermixed with other students in a program of general education. This is a grievous error. It rests on an assumption which is groundless, as the history of medical, legal, and many other forms of professional education clearly demonstrate. All professions have been enhanced by the broadening of their education, and by the enriched cultural and social contacts which such enlarged educational opportunities necessarily entail.⁴⁵

We note, therefore, that Dr. McGrath advocates an "intermixing" of music students with students in other areas of learning in their post-high-school education, even where greater selectivity and higher levels of musical achievement are found. Interestingly, an increasing number of musicians and teachers of music are among the most vociferous proponents of this point of view.

The Pittsburgh Enriching Program for the Mentally Superior

Until now, we have presented two types of basic educational patterns that might be followed by the musically gifted child: (1) the highly specialized conservatory type conceived along the European tradition of the nineteenth century; and (2) the high school technical type that is currently advocated by some educational leaders and that offers a broad liberal education with specialized training and experiences in music. The limitations of both of these patterns have been presented. A third type of educational program for talented children may be referred to as the "enrichment program." The Pittsburgh Public School system, among several others, embarked on a program of this type in 1954. That same year it completed construction of the plan which is titled, "Enriching the Program for the Mentally Superior." Since then, the system has reevaluated the program, made certain changes and additions which were based mostly on the findings and suggestions of teachers, supervisors, and principals, and issued a "1958 Revision" under the same title.⁴⁶

At the present time the program is limited in scope to the elementary and junior high school levels, beginning in the kindergarten and extending through the eighth grade. The school administrators are frank to admit that

⁴⁵ Earl I. McGrath, "General Education in Music: A Review and an Appraisal," *The Bulletin of the National Association of Schools of Music*, No. 47, February 1959, p. 6.

⁴⁶ Calvin E. Gross, "Enriching the Program for the Mentally Superior," 1958 Revision, Pittsburgh Public Schools, December, 1958, Unpublished report.

they are still in an experimental stage; improvement of techniques, the gaining of new ideas, and the opportunity for expanding will come as they continue to explore further possibilities. The resources of the teachers, the supervisors in academic and special fields, the librarians, "the parents as understanding co-workers," and the "talents of members of the community should be explored for the enrichment of the program. . . . The children, themselves, should be made to feel the responsibility for their own growth."⁴¹ The Pittsburgh Public Schools provide musical enrichment through instrumental and vocal programs for mentally superior students and those who are especially talented musically. Opportunities are provided for performance in many media including vocal and instrumental solo and ensemble, participation in school and community concerts including radio and television. Highly gifted performers are invited to appear as soloists at Carnegie Music Hall. Special listening projects are assigned individually to children who desire to extend their experiences. Research projects are encouraged and directed by the music teachers, and those who reveal creative interests are stimulated to compose for school and community recognition.

Provisions Made for the Musically Gifted in the Philadelphia Schools

As part of a study of the musically gifted child, a survey of the Philadelphia Public School system was conducted. The practical purpose of the investigation was to ascertain what specific provisions were being made for the recognition, encouragement, and artistic training and growth of talented students in a city of Philadelphia's size and long history of national cultural leadership. Dr. Louis Wersén, director of Music Education in the School District of Philadelphia, gave his personal cooperation by providing the necessary data for the survey.

In brief, the Philadelphia program starts with the premise that the musically gifted child is characterized by superior musicianship and artistic solo performing abilities. Equally important factors of a more general nature are the student's ability to accept criticism, make constructive changes, and develop a sense of balance in arranging his school schedule to allow time for music along with academic studies. Talented students are given the opportunity to conduct, manage, and compose for school musical organizations. They are often encouraged to study with private teachers or at a nearby conservatory; within the framework of the school a wide variety of instruments can be studied. Once a year the advanced members of the All-Philadelphia Senior High School Orchestra replace an equal number of the members of the Philadelphia Orchestra for a student concert. There are chances for solo and ensemble performances for many school functions and

⁴¹ *Ibid.*

for civic events. Frequent radio and television concert broadcasts challenge talented young musicians to strive for high levels of performance and to extend their repertoire. Thirty-two scholarships per school year are awarded to graduating high school students for four years study as music majors in colleges, universities, and conservatories. The school system, guided by supervisors, the director of music, and his assistants, maintains a constant search for talent.

GENERAL OBJECTIVES IN CURRICULAR PLANNING AND DEVELOPMENT IN SCHOOL MUSIC

While this chapter deals primarily with the program of education for the musically talented child, the general function and values of music for all school children also should be considered. The music program in the public schools should serve the needs of the general student population as well as the musically gifted. The former group should receive profitable cultural experience according to their interests and abilities as part of the total general education, while the gifted should share with their fellow students their superior abilities in musical experiences.

Authorities and teachers in music education are at variance regarding content material, teaching procedure, and aims of music in our elementary grades and junior and senior high schools. The wide cultural and economic differences in our country, the constantly shifting social movements and changes in public opinion, the current trend in emphasis upon science education, and the vast expansion of our educational structure resulting from huge increases in school population have all effected changes in the nature and scope of the programs offered and have increased the demands for personnel and physical equipment. These underlying social forces are creating uncertainties and diversified concepts regarding the nature and role that music and the music educator are to play in our schools and society.

The most conscientious and ambitious school music teacher, who is highly talented and skilled in his art, may unfortunately find himself ineffective in influence and at odds with his teaching situation unless he has sufficient insight and awareness into the educational objectives of his school and its relation to the community. This does not mean that he is to sacrifice or abandon the integrity of his artistic ideals and standards. The problem does not lie here. It lies, instead, in his ability to formulate and communicate effectively his *musical objectives* to the people with whom he works and to whom he is *responsible*—the students and their parents, his faculty colleagues, the school administrators, and the whole community.

The music teacher's first attempt to define his objectives will be largely dependent upon and determined by the forms and levels of music to which

the community is accustomed and prepared to respond. This is the important focal point that precedes the implementation of a school music program. The music teacher must be fully aware of the established musical experiences and values in the community and the extent to which the people turn to their own resources for recreation. These are the existing cultural dynamics that define the quality of meaningful musical expression of the school children and their parents. These reflect and define the musical tastes and idioms that children carry into the school and upon which the music teacher may then build a bridge for the expression and conditioning of his own artistic convictions and tastes. From this point on, having stated his objectives, the music teacher, in cooperation with his co-workers and with the good will and understanding of the administrative office, is responsible for creating and organizing his music program.

Curricular Planning and Development in Music

Music educators in this country have for many years given careful consideration and attention to the matter of formulating curricular suggestions and recommendations for all school situations. The National Association of Schools of Music has devoted itself primarily to curriculums of post-high school professional music programs, but there has been some overlapping and cooperation between this organization and state and other accrediting agencies and other music teachers' groups including the Music Teachers National Association and the Music Educators National Conference. Since we propose at this time to stress the music curriculum in public schools, reference will be made particularly to the latter organization as the authoritative body from which we will draw suggestions. Although the Conference has issued other published sources of information concerning music programs in the schools, the most germane work to this discussion on curriculum planning is the 1945 publication, *"Music Education Curriculum Committee Reports."*⁴⁵

Music in the Elementary Curriculum

The Curriculum Committee suggests that the elementary school music curriculum be scrutinized by teachers and parents in the light of its effective relation to:

... the ultimate aim of all education—namely to assist children in the attainment of right judgment, appreciation, and control of social values. As the needs of society change, the content of the curriculum tends to change.

⁴⁵ Hazel Nohavcek Morgan, ed., *Music Education Curriculum Reports 1945*, (Chicago: Music Educators National Conference, 1946).

therefore it should never be regarded as final. It is recognized that music serves as a means of integrating the child's personality through a rich variety of musical experiences.⁴⁹

According to the committee these experiences are aimed toward the child's enjoyment in his understanding and growth in music. They include performance on preschool instruments, rhythmic, individual and group singing, various types of instrumental solo and ensemble performances, the encouragement of music creativity in the classroom setting, performance in the school, church, and other community outlets, listening, and project reports.⁵⁰

Music in the Junior High School Curriculum

The Committee has indicated its awareness of the diversity of opinions and lack of uniformity in concepts and practices regarding what should constitute an effective music curriculum in the junior high school grades. It has made recommendations for two different kinds of school situations: (1) the school which has no organized music curriculum or music teacher; and (2) the school with an organized music program. Regarding the first, practical suggestions in brief are that provisions should be made for some sort of recreational singing in keeping with community interests and levels of musical culture. Outlets should also be provided for individual performances. There should be listening and audio-visual materials—phonograph records, sound-films, radio, and television. Students, teachers, and professional musicians should play in classroom and assembly programs. For the school with an organized music program, recommended *minimum* offerings should include, in addition to the experiences noted above, a coordinated course in music theory and creative activities to encourage the writing of original music, such as song-games and dances, operettas, and the construction of musical instruments.

Music in the Senior High School Curriculum

In the senior high school the thoughtful teacher must meet the immediate musical needs of the pupils and at the same time arouse in them through listening and performance an interest and understanding of good music according to his own standards. According to the Committee, there must be an adequate number of performance groups which not only are of interest to the entire student body but also provide opportunities for those with exceptional musical ability to compose, conduct, and engage in solo

⁴⁹ *Ibid.*, p. 1

⁵⁰ *Ibid.*, pp. 1-2.

activities. The courses in music history and appreciation should be geared at an academic level parallel to other history or literature courses. In general, these courses are directed toward the development of intelligent listeners to music rather than to the specific training of performers. Theory and harmony courses should include sight-singing and dictation as well as training in written and keyboard harmony.²¹

BARRIERS AND OPPORTUNITIES AFFECTING THE MUSICIAN TODAY

We have discussed the nature of musical experience, described what we mean by talent, and observed the musically talented student in the home and the classroom. Now we come to one final problem. The citizens of a society must somehow become aware of the barriers which confront young people when they leave school equipped with talent, training, and enthusiasm.

The Composer

Assuming that we are dealing with the genuinely gifted creative person in music who has acquired the technical skills of his trade and possesses a sense of broad artistic and social values, how does our society provide for the recognition, support, and encouragement of his expressive contributions? The status of the American composer in our time has changed radically from that of his European predecessors who were in the service of the church or the recipients of royal or state patronage. Our American composer ordinarily does not enjoy the security of his contemporary fellow artists in certain foreign countries who are subsidized by their respective governments. Unless he is fortunate enough to procure a post as composer-in-residence at a college or university or is awarded a grant such as a Guggenheim Fellowship, his status remains that of a free agent in our system of free enterprise. He may receive temporary support from commissions of private foundations and institutions for the writing and performance of some musical work, but other than through these few avenues his chances of earning a living as a composer are indeed slim. In fact, in most instances when one of his compositions is publicly performed, even when he receives a fee, he will probably suffer a substantial financial loss because of the expense incurred in having the musical score and parts copied and reproduced.

Since few American composers are able to earn even the most modest living directly from their creative productions, they must seek other related or unrelated channels for livelihood. Some offer their services as arrangers

²¹ *Ibid.*, pp. 4-5.

for movie, radio, and television music from which they may derive handsome incomes through their skills. Unfortunately, in situations such as these they receive little if any aesthetic or personal satisfaction. Some are compelled to turn to teaching in conservatories and college music schools. There they soon discover that the detailed and numerous demands imposed upon them in the line of duty expend their time and energies to the extent that their creativity suffers. The nature of the creative process is not something that can be turned on and off like a stop watch. Its flow is facilitated by the accumulation of leisurely meditation during which the aesthetic experience simmers in the mind until it is ready for expression.

The Performer

The young, gifted performer and conductor share with the composer similar basic disadvantages of our free enterprise in the arts. Inasmuch as society continues to resist the acceptance of the concept of a state or national system for subsidizing the arts, the musician must either become reconciled to a compromising environment that promises limited personal rewards and professional satisfactions or dissuade himself entirely from continuing with the study and practice of his art. Although he may reveal unusual musical gifts and may have applied himself assiduously for many years to develop his skills, as he reaches maturity he finds himself questioning whether his artistic talent will be sufficiently valued and rewarded commensurately with developed talents in other fields. He discovers also that in order to launch himself on a concert career he must first demonstrate his ability by arranging a maiden public appearance in a concert hall in one of the major metropolitan centers. In this connection, he must personally find the means for financing the substantial expenditure that is normally involved in such an undertaking. Having overcome this obstacle and having achieved artistic success and recognition, he must now submit himself to the conditions prescribed by some concert management syndicate.

Many other gifted performers will by choice or necessity seek positions in symphony orchestras or participate in various kinds of vocal or instrumental ensembles. With few exceptions the duration of the concert season will be relatively short so that the majority of them will be compelled to find additional means for supplementing their incomes.

Opportunities for professional conducting are seriously limited for the obvious reason that the supply of talented young conductors by far exceeds the number of symphonic, operatic, and choral organizations that are in existence in this country. Fortunately, however, churches, college and university music schools and departments are engaging increasing numbers of talented musicians who fulfill conductorial functions combined with other duties as performers, teachers, and scholars in music.

The Teacher

One increasing demand for the talents of trained musicians in this country now comes from the public schools and colleges. With the raising of the standards and quality of the music performed by school children, trained musicians who are interested in relating their artistic skills and experiences to educational objectives and in contributing to the cultural development of a community will derive definite personal and artistic satisfaction from teaching. To be effective and far reaching, music teaching responsibilities in the school situation should be related to the community setting. For this reason, the leader in music must develop a calculated sense of awareness of the social conventions and cultural traditions which have been formulated in the community in which he functions.

SUMMARY

People differ greatly in their capacity for musical understanding, performing ability, and creative aptitude. However, one rarely finds a person who is completely unmusical or totally insensitive to some kind of musical experience. For this reason music belongs to us all, to whatever degree our innate capabilities will allow us to enjoy its wealth of expressive tonal varieties. Herein lies the basis for the age-old concept of the universality of music with its social and educational implications. From these roots spring the rationale for the justification of the music educator's creed, "music for every child." Inherent in this ideal of cultural democratization as part of the total educational development of the American school child is the ideal of furthering to the utmost in each individual his capacity for musical growth. This commits the schools to a sharing with the parents and the cultural forces of the community the responsibility of recognizing the incipient talent of our youth, wherever it is found. Only through the cooperative efforts of these adult forces can the young people be given every opportunity for the fullest realization of their artistic gifts. The extent to which a community is able to digest its indigenous talent is a measure of its own intellectual stature and ideals. The nurtured talent will in turn foster the cultural creativeness and attractiveness of life within the community.

When musical talent is truly revealed in a child during his early childhood, the most important and immediate challenge faced by those who are entrusted with the responsibility of his cultural and intellectual growth is to awaken within him an awareness of his giftedness so that he may lead an artistically purposeful and wholesome life. This marks the actual beginning phase of his long and painstaking artistic training and program of general education. Problems of a more baffling nature arise when talent remains latent or in instances when certain superior children possess a variety of

gifts. There the critical question lies in the discovery, identification, and measurement of the various talents to ascertain which of these is the predominant capacity to be stressed and nurtured, always assuming that some other stronger trait will not emerge later.

In the final analysis, any school entrusted with the teaching of talented children must meet the challenge by providing inspired instruction, specific and comprehensive music courses, and opportunities for stimulating participation in the various kinds of musical experiences; if successful, each student will leave each classroom one step nearer his goal. The total function then of our schools is to offer these children education beyond narrow specialized training, whether they are preparing to become composers, performers, conductors, scholars, or critics.

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CHAPTER TWELVE

Creative Dramatics

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Creative dramatics is a particularly fruitful area in developing the gifted child. Creative play and group experiences which involve acting out imaginative thoughts, ideas, and stories teach the child to express himself and to communicate effectively. This is important in our world today because modern transportation and communication have eliminated old geographical barriers and compressed people and their cultures into a new kind of world neighborhood. We want our children to gain a knowledge of the standard curriculum of social studies, language arts, and science, yet we know that the arts help to give an individual a wisdom in thought and feeling with which to handle all knowledges with greater insight.

The arts represent the cultural and esthetic values of the people themselves, their dreams, and their aspirations. In a very practical sense, creative dramatics has special values for personal development, for it relates itself to the totality of all the arts. The varied experiences of creative dramatics help the gifted child to develop his potential ability more com-

pletely; they help him express his imaginative self through the developing powers of his maturing talents.

Basically, theatre is a social art in which living people become the medium of expression. Theatre is social, for it provides a strong foundation for a child to relate himself and his inner feelings to other people, events, and places. It encourages individual growth in the framework of social relationships.

CREATIVE DRAMATICS DEFINED

Creative dramatics is an art which involves an informal, imaginative, and intuitive expression of thoughts, ideas, and stories in a group experience situation. It is an experience in improvised drama, during which activity the child or individual becomes a character not himself and makes up his own expressive action and pantomime; this is generally accompanied with verbal improvisation. In creative dramatics no scripts are used, and no formal scenery, costumes, lighting, or staging is needed. Creative dramatics involves neither a stage nor an audience. The four basic requirements as listed by Geraldine Brain Siks are: "A group of children, a qualified leader or teacher; a space large enough for children to move about freely; and an idea from which to create."¹ The idea from which children create may spring from a personal experience, a poem, a story, an imaginative thought, a painting, or a piece of music.

When children have a personal experience or a current happening in the neighborhood that has captured their attention, they often share these adventures with their friends. In the telling of these incidents to a group, a reciprocal communication occurs from which evolves a sort of meaningful story that each one in the group can enjoy and savor. A question leads to a forceful repetition of what happened; another remark leads to a fleeting impersonation of a character in the incident; and so on. A unifying factor, of which the children are hardly conscious, gives freedom to their thought and feeling as they act out the episode to its fullest.

In the beginning of children's experiences in creative dramatics, incidents or happenings in their environment offer real material for them to act out. In the classroom a teacher could begin by asking the children: "What did you do this weekend?" "Did anyone take a trip this weekend?" "What is your favorite sport?" Those children who wish to share their experiences with the group may be encouraged to tell their experiences through pantomime. Perhaps two or three children had an experience together as a group which they could share with the rest of the class. Through

¹ Geraldine Brain Siks, *Creative Dramatics, an Art for Children* (New York: Harper and Brothers, 1959), p. 21.

their intuitive action and spontaneous dialogue, under the guidance of a creative teacher or leader, the substance of creative dramatics takes form.

HOW CHILDREN ACT OUT A STORY

The play spirit is basic in the art of creative dramatics. Children participate in action which may develop from an idea, a story, a poem, a legend, or very often from some current event read in the newspaper and discussed in the family circle. The child may become or pretend to be any person or thing he chooses. In creative dramatics, children plan and solve problems through their own dialogue and action. Their thinking becomes a prelude and guideline for their action.

The Planning Period

During this period, the plans for creative playing are made by the group; they must be definite and well conceived. The teacher or leader listens to the ideas of the boys and girls, asks questions, and guides the thinking in the fields of the children's experience so that their own perceptions bring forth a good judgment for action. A planning period is built around seven basic steps:²

1. The main points in the story or part of the story that is to be played.
2. The people in the story or part of the story that is to be played.
3. The setting.
4. How the story or part of the story starts and how it ends.
5. The *general ideas for dialogue*.
6. The necessary properties.
7. The selection of the parts.

These seven basic steps may be used in entirety or in part, with various emphases, depending upon the demands of the story. The children exchange ideas and discuss their plans for acting out the story. The leader gives active attention and organizational direction in bringing together the ideas of the children. His job is to summarize, to make decisions, and to shape the suggestions given into a definite plan.

The Playing Period

This process takes place immediately after the children have agreed upon their plan for acting out a story. A drama is action. In creative dramatics the story may be told in pantomime, in rhythmic movement, or in

² Burdette S. Fitzgerald, *Let's Act the Story* (San Francisco: Fearon Publishers, 1957), pp. 14-17.

incidents full of emotion. This performance may involve dialogue. Most ideas or stories which children characterize have more action than dialogue. Thoughts and feelings may be communicated mostly by action and by pantomime with spontaneous dialogue; such action and pantomime are created by the children as they move through the story. They are introduced to such elements of drama as characters, plot, theme, dialogue, form, and rhythmic movement. Freedom for creativity allows spontaneous thought and words on the part of the children. Self-expression and teamwork among the children bring enjoyment to the whole group. Throughout the playing period, emphasis is put upon feeling. "It is the feeling that motivates the action which counts."²

The Evaluation Period

The evaluation period immediately following the playing period is most important in the learning process for the child. The leader asks questions to draw comments and reactions. Positive thinking and constructive criticism are basic in analyzing the acting of the group. The children evaluate why the actions and words told the story well. Any suggestions are kept objective and related to the action and characterization, rather than to the individual child who portrays the character. Critical thinking is encouraged in the children as the leader questions them as to how the playing can be improved. The story may be played again with another group of children, reevaluated, and repeated as often as the children wish to refine the story.

VALUES DERIVED FROM CREATIVE DRAMATICS

Creative dramatics develops the child (1) mentally, (2) socially, (3) emotionally, and (4) physically. A child develops creatively by using his imagination to meet problems, such as deciding how a scene should be played, where and how a story may be broken down into scenes or acts, how the room and available space may be arranged best to create the illusion of the setting necessary for telling, playing, and evaluating each theme of the story.

The need for cooperation among the participants makes creative dramatics a democratic and a socializing force. Purposeful discussion, planning, and evaluating bring an interchange and interaction of ideas and personalities. Children grow in their regard for the opinions of others and their sensitivity to the feelings of others. Children learn effective communication through practice in thinking how to phrase and reword in order to make

² Winifred Ward, *Playmaking with Children* (New York: Appleton-Century-Crofts, 1957), p. 35

clear what they wish to suggest. Such learning is essential for the good of the play, but, more important, for the perceptive and communicative development of each child. Winifred Ward sums up the values of creative dramatics with this comment:

Creative dramatics depends upon group work, and fortunately, it is fascinating enough to children to provide a strong incentive for working together. And since the very essence of creative dramatics is the playing of all kinds of people and the discussion of their attitudes and motives, it stands to reason that a skilled teacher has much opportunity for guidance. Naturally, such guidance comes about, not from the teacher's pointing out any desirable patterns of behavior, but from careful questions to stir the children's thinking.⁴

Creative dramatics is especially valuable for the well-being of children. Emotional tensions are released through the characters they play in creative playmaking. Children gain psychological stability and understanding by creating a variety of characters who experience different kinds of emotions, conflicts, and struggles and who understand the values of truths, ethics, and loyalties. The teacher is challenged to use his best professional experience and integrity to see that the children are given the kinds of character identification that become the best experience for their personal growth and stable development.

Physically, a child gains in bodily coordination through participation in creative dramatics. With the full rhythmic use of his body, a child creates a variety of characters in stories and plays. He may be a powerful animal, a tornado, a witch, an evil spirit, or a bat. He may have the agility and strength of Robin Hood, or he may be a weak and sickly beggar.

When we conceive of creative dramatics in relation to children, we think of (1) imagination, (2) personality development, (3) communication, (4) awareness, and (5) sensitivity. These are some of the important areas in which the child experiences tremendous growth. The more gifted the child, the more noticeable is the growth. When a child is encouraged by an understanding and creative teacher, he grows to appreciate and be sensitive to the feelings of conflict and forces that work within individuals, to be aware of himself, and to appreciate the arts, particularly drama, as a means of self-expression. "Creative dramatics offers group experiences which are rich in fun, excitement, problems, struggles, understanding, dreaming, creativity, beauty, and laughter."⁵

Creative dramatic expression is a spontaneous activity, the result of one's own initiative and free will. It is set in a frame of readiness of mind and

⁴ Winifred Ward, from a personal letter, June, 1959.

⁵ Geraldine Brain Siks, *Creative Dramatics, an Art for Children*, p. 400.

body for action with anticipated pleasure. Such creative dramatic expression stimulates, whether at home, school, church, on the playground, in the summer camp, or in the community. Creative dramatics is like an improvised musical ensemble. Its subject content is not fixed in a music score or text to be read and memorized for performance. Rather, it involves sharing and teamwork to create an improvisation, for expressive activity is both the need and the goal. It is the kind of activity that has a role for everyone and is not hampered by changes in the group. It has no fixed ensemble assignments or cast for successful performance. Creative dramatics discovers, fosters, and releases all degrees of creative inspiration and talent.

CHILDREN'S THEATRE DEFINED

Children's theatre is an art form which provides the experience of a play selected, rehearsed, staged, and produced for a children's audience. The usual format of children's theatre is that of adult performers acting for children; however, in some instances, the actors may be children, or both children and adults. The play is produced through the coordinated work of a team of actors and technical artists under the training and artistic guidance of a director. The goal is a finished stage production. Such theatre experiences develop the child's sensitivity to other persons and build his awareness of himself as an individual.

Children's theatre also gives ample opportunity for children to grow through experience. This again is a group experience in which many children sit side by side in a theatre, participating vicariously as an audience enjoying a play. The plays which they see are written by a playwright. The dialogue of the play is memorized, and the story or plot unfolds just as the playwright has written it. The action and dialogue are not spontaneous and created by the children on-the-spot from a story, as is done in creative dramatics.

The plays presented in children's theatre are full, as is children's literature, of plots which concern themselves with lasting truths of living. These may be disguised for greater enjoyment and may be represented by such exciting personalities as characters from well-known fairy tales, giants, fairy godmothers, kings, queens, or bewitched animals. This large realm of experience often brings a gifted child close to an understanding and appreciation of these noble characters which he very likely would not develop if he were left always to himself in a lonely atmosphere. The very act of enjoying a play written truly for children in a theatre, with many other children present, gives him a social oneness with his friends and peers.

Occasionally, gifted children with dramatic talent are used in a cast with

adults. Such a combined cast provides unusual opportunity for gifted children to act, and it gives the play a new kind of empathy with a children's audience or an audience of adults and children. The problems inherent with a cast limited to children acting before an adult audience are eliminated. The gifted child, who, because of advanced interest, more mature judgment, and taste, may feel that he is misunderstood, that he cannot communicate with others, and that his own particular ways of expression are not appreciated, will gain freedom, understanding, enjoyment, and appreciation from vicarious experiences in children's theatre.

Local high school drama groups should be encouraged to extend their theatre presentations to include plays that have an appeal for children of elementary school age and interest. A certain kinship and understanding exist between elementary and high school students; this does not exist when adult actors only are in the cast. Such experiences create wholesome aspirations in elementary school children and cause them to look forward eagerly to the time when they themselves may act in high school drama productions. Assembly programs given by high school students for elementary schools and for parent-teacher community functions which children and parents attend as family units are highly desirable for basic home-school-community development.

Children's theatre and creative dramatrics are the resources of children's drama. Children's theatre is a formal presentation of plays written for children which appeal to children's interests and understanding. Creative dramatrics is drawn from material such as stories, poems, ideas, or related arts which lie within the interests of children, but which are presented in an informal manner. Both offer opportunity for growth and development on the part of the child. Each is important, and together they complement each other to become a rounded dramatic experience.

Television as Children's Theatre

Television has become the children's theatre in the home. Plays in the legitimate theatre occupy a small amount of the child's time. The hours spent in viewing television usurp many more. Parents and teachers should know and personally view some of the better programs which are suitable for children. They should talk about them and encourage their children to view these programs. This can become a worthy type of project for the entire family. In the school program these viewing experiences may well become motivations for group discussions, interpretation, and evaluation. Many educational television programs could be related to the school science program, the language arts, or social studies programs. For full personal development, however, children need help in establishing standards

for their choice of things to do during out of school hours. They need to evaluate and give meaning to the things they hear, see, and do.

CREATIVE DANCE

Dance is closely related to dramatics. It is a natural expression of the child in his dramatic play. His body responds with the bold swagger of a pirate, the confident, easy walk of a cowboy, the loping rhythm of a galloping pony, as the child becomes or acts like these characters or animals. The art of portraying a character in a play draws upon skills in dance as well as upon skills in dramatic action and dialogue. A successful actor portrays a character with his whole body, not with just an isolated part of his body—his voice, his face, his arms, or his hands. What an actor *feels* while being a character in a play is shown throughout his entire body.

Dance is movement. It is the art of saying or expressing something through one's body. Through creative movement, the body can express emotion, can communicate thoughts and ideas, or can suggest things which are not put into words. As with music in the theatre, one can indicate through dance and gesture what one cannot and may not say in words. The instinctive forward lilt of the body when greeting a friend is entirely different from the pulling back and recoiling attitude shown in reacting to a person one does not like. The muscles grow tense in situations of anger, anxiety, fear, or apprehension. The body is an instrument that portrays feeling through movement.

Children participating in creative dance should be acquainted with the basic skills of locomotion: walking, skipping, jumping, galloping, crawling, running, and the like. Understanding the ways in which the body can move—bending, twisting, turning, stretching—is of value. Also, the *quality* of movement is important—the intensity or dynamic force with which one moves—for this reflects the inner attitude of the mover. An actor in the theatre must learn how to use his body effectively so that he may portray a character fully through movement and gesture, as well as through his voice. The arts of drama and dance cannot be separated. One aids and strengthens the other in helping the artist express what he has to say.

Children come by the art of dance naturally. Long before a child can communicate in words, he communicates through the movement of his body. Almost at birth an infant tenses up his muscles in response to a sudden noise. A very young child playing with other children shows his feelings through movements of his body. When he is angry, his striking, hitting, or kicking movements are violent; yet, by contrast, the same child can be gentle and loving in movement when he is pleased. A child may

handle a pet animal with the lightest of touch, stroking it with "velvet" fingers; when he is happy, his step may have a happy, bouncy spring, or with the full abandon of his body he may roll over and over on the grass in the sheer joy of play. The essence of dance is something from inside an individual which comes out of the self, through a giving of the self. The opportunity to explore movement, to invent patterns, and to express through movement one's thoughts and feelings are ways of learning to dance.

As children grow older, teachers can encourage this expressive medium by giving them opportunities to pantomime and tell a story, however simple or complex, through their bodies. Most important, the teacher must respect the creative imagination of gifted children and encourage a freedom of expression. Such children do not learn to dance by performing dance steps or patterns imposed on them by an adult.

Many gifted children who have had formal dance are apt to develop a structured and often artificial kind of approach to movement. Individual training at too early an age may discourage children from later interest in dance. Too frequently, parents become enamored with the glamor which surrounds children's public appearances in dance. Such restricted training has little place in creative dance unless the child can learn techniques from a worthy, private dance instructor who extends the skills learned in the elementary school classroom. Ideally, the private dance teacher and the classroom teacher would do well to work together so that each may understand what the other is trying to accomplish. Sharing ideas, visiting one another's classes, observing teaching practices, and conferring with one another can build a wholesome relationship between school and studio, as well as strengthen the abilities of each teacher.

An idea which comes from the children is one of the most useful approaches for teaching creative dance. Young children "move like" something as they imitate flying birds, airplanes, giants, elephants, horses, turtles waves of the ocean, or a fire engine. Older children *relate* rather than *identify* themselves to things that move. They may show the work which people do by performing rhythmical movements, such as chopping trees, roping calves, or loading a boat, or they may act out incidents in a story through dance.

A poem, a musical composition, or a dramatic incident are other means of approaching creative dance. The teacher should remember that whatever approach is used in the classroom, the creative imagination of the child is the most important element of dance experiences. Through questions and appreciation, the teacher may lead or guide or encourage the child to express his feelings and ideas through movements.

Space itself is essential to creative dance. The teacher who takes the children, at least occasionally, away from the crowded classroom to the gym

or all-purpose room or outdoor play area, gives his boys and girls opportunity to explore movement and to experiment with freedom.

DRAMATIC EXPRESSION AS INNATE EXPERIENCE

A feeling for dramatic expression is an inherent and basic human quality. Dramatic play is natural for all children and is a normal part of their daily living. We see it in their solitary play and with groups of children in the home, the neighborhood, and the school yard. There children relive experiences that have made an impression upon them, and they create new experiences in their make-believe world. Every adult can recall experiences in his childhood when a sandpile and miscellaneous blocks of wood became railroads, trains, engines, and an endless number of other objects which were built into sequences of imaginative and creative experiences with a remarkable sense of realism. The home environment is the place where children's talent takes its basic roots. This activity in early childhood is spontaneous from its very beginnings.

Children naturally imagine and create. The creative spirit is in each one of us. It is there for us to find, to develop, and to express. Creative thinking and doing are a vital and unceasing part of the child's world.

FACTORS IN FINDING DRAMATIC TALENT

Dramatic talent has no single factor or a selective group of factors to determine giftedness in drama. Rather, certain aspects of dramatic sensitivity become guideposts along the way as the child grows and develops. Dramatic talent exists to some degree in everyone. It appears very early in the home and nursery school when children create games and activities related to the immediate world around them.

The gifted child in drama has an aptness to intuit and see the relationships of social situations "on the spot." He verbalizes easily, comprehends meanings with insight and definition; he feels human relationships in his peer groups with social sensitivity, and he handles his body with ease and poise for his particular stage of physical and emotional maturity. He has an ability to visualize situations, staging, and character roles from the printed page, and he identifies himself as a character. He is attentive, alert, and responsive. He creates a dramatic role through speech and action as he easily tells a story or gives an account of some experience.

Giftedness in a child is not indicated by intellectual and reasoning ability alone. Such talents as creative thinking, scientific ability, social leadership, mechanical skills, and talents in music, art, and drama are

individual endowments which all children have in varying amounts. Unusual endowments should be the mutual concern of educators and lay people who should develop a school program to meet the needs of such gifted children.

DRAMATIC PERCEPTION

A dramatic sequence, like a passage of music, exists in time, and the student must remember the theme, the story, the voice of the character, and the rhythmic movement of the action. The image of the character that he plays must replace his self-image for the role that is performed. The freedom of artistic expression begins here. Halting performance or faltering expression of a dramatic line comes when the student has not secured an understanding and conception of the story or the dramatic episode as a whole. When he is conscious only of words or actions, one by one, he carries the part in robot fashion. The wise teacher takes every opportunity and makes every effort to help the student understand and feel the story as a whole. Only then is the student ready to release and forget his own personality. The skillful manipulation of words in a dramatic sequence is frequently mistaken for artistic dramatic ability. Acting involves insight, perception, and adequate technique in various dramatic skills to express the role of the character. In a very practical sense, all students must continually develop their powers of dramatic perception and grow through dramatic experience, as performers, audience spectators, and television viewers, in order to appreciate the art of drama.

DEVELOPMENTAL EXPERIENCE IN CHILDREN'S DRAMA

The innate capacities and talents of each child will give breadth, depth, and a living social texture to classroom dramatizations. *Experiences in children's drama foster situations in which boys and girls may know themselves better in terms of their unique intellectual talents, their physical poise and coordination, their aptitude for the various creative arts, and their ability to communicate with social ease and human understanding. The educative values lie in the process and the quality of the child's experiencing and not in the end-product of a perfected dramatization for audience approval. As boys and girls mature, their dramatic sense will lead them to select material studied in the various subjects during the school day as appropriate material for dramatization. Here again, the true educative value lies in the original thinking, planning, library study, seeking of information, summarizing of material, and setting of the play in dramatic form.*

As the content of any original play increases in its quality, in its appeal of subject content, and in its dramatic form, creative review is recommended for greater insight. Many original plays are excellent for a one-time experience in synthesizing learnings in a new dimension, but the subject material lacks sufficient resource and dramatic content. The repetition of such a play provides little or no continuing satisfaction. Dramatic activity can all too easily degenerate into stupid and senseless fiddle-faddle. Like other educational resources, creative drama has potential extremes in values for either good or bad. The teacher must grow in perceptive and artistic intuition and in teaching technique in order to guide the children so that their ventures in creative dramas may have positive and intelligible educational goals.

The creative story dramatization should be allowed to develop so that songs, vocal ensembles, and instrumental background and interludes, either live or recorded, can be used to add color and mood atmosphere to a dramatic sequence. Often rhythmic movement and dance will be most appropriate and add much to the art of the dramatic result.

Instruction through original plays and pageant episodes provides a gateway to dramatic learning and a significant background for selecting published plays of quality for study and production. As such plays are produced, the young actors and actresses need to have sufficient background to free themselves from their own identity and to change themselves into the characters they are representing. Each boy or girl must identify in inner feelings and actions with the character of his or her role so that memorization of words becomes less important and not so formidable.

The spoken lines will come more readily if the student has knowledge of the dramatic structure, the sequence of situations and scenes, the ideas projected in the play, and an understanding of the characters. When a student knows these elements of the play, he gains confidence. He will be able, through improvisation, to convey the basic concept of the idea expressed by the playwright, even though the exact words may not be in ready recall. What a playwright has written into the lines of a great play, a student will say in essence anyway, if he understands fully the dramatic import.

In older children, greater depth in their dramatic experience may motivate them to want to perfect a play in production for an audience. Such a situation gives them an opportunity to test their ability in feeling a dramatic phrase line or developing dramatic climaxes, color of imagery, and the turn of expression. Appropriate technical aspects in staging, lighting, and costuming can be added for the actual production before an audience, such as a school assembly, a PTA meeting, a community club, or perhaps an audience in a formal theatre. All of this activity is effective if it is an outgrowth of the regular classwork and contributes to the educational growth and the goals set up for the students in their school program.

DRAMATIC ENSEMBLE AS OPPORTUNITY FOR INITIATIVE AND DISCRIMINATION

Participation in a play is like playing in an orchestra; careful thought must be given to the balance, timing, harmonic background, and thematic projection. As in an orchestra, a thoughtless member can throw the entire ensemble into discordant confusion and meaningless pandemonium. Playing a part in a dramatic production, as in an orchestra, carries responsibility for solo lines, accompaniments, contrapuntal variations, and tutti climaxes. Each student must know the artistic texture and format of the whole with its various aspects of dynamics, balance, tempi, accentuation, mood, cadence, and the continuing shaping and blending of the phrase line. Such participation motivates the acceptance of artistic responsibility and the united concern of each individual for the group performance.

Each student must know his character role, just as each player in the orchestra must know his instrument. He must have sufficient technique to express the part or role that is assigned. The dramatic ensemble, as is true of the orchestra or band ensemble, needs a wide spread of talent in its various aspects of production. Drama, like the choral ensembles, uses language, which adds verbal meaning beyond the instrumental tone of a band or orchestra to tell the story, portray the emotion, and reveal the character. Spiritual, aesthetic, and moral values are inherent in a dramatic ensemble; they often are increased when music is added as a background, or when spoken lines are set to melody.

In drama, cooperation, sharing, and working together become a way of life under the guidance of a wise teacher. Contributing ideas, trying them out, and evaluating them for the purpose at hand facilitates and makes the way smoother for the growth of mature attitudes. In this climate, each student must be willing to subordinate conflicting personal desires in favor of group interests and objectives and to do this in the spirit of good will. The student learns that the value of participation exists in all kinds of dramatic roles and technical activities and that the gifted cannot carry the major roles at all times. All of this makes for a liberation of true individual freedom in a democratic social structure.

THE IMPORTANCE OF LEARNING TO LISTEN

Dialogue in creative dramas is a two-way process which requires as much attention and insight for listening as for talking. Children must learn that if genuine conversation is to take place, no one person can monopolize it. In discussion, conversation needs a sharing of ideas and a respect for the other person.

Language functions through listening, speaking, reading, and writing. The sense of hearing is one of the first avenues of communication every child has with the outside world. He will use it more than any other language function and he must learn effective listening skills that result in a perception of all that is heard. Such learning develops the physical function of hearing into an art of listening. Speech development follows listening, and together these language functions fill the major part of the time the gifted person spends in daily communication.

Speaking and writing are avenues of language communication from an individual to others, while listening and reading are avenues of communication outside of one's self. Both listening and reading involve mental processes of perceiving, thinking, and reacting. Reading uses the sense of sight and develops its function into an art of seeing and interpreting. In the art of listening, the person uses spoken symbols of sound as his aural experience for perceiving, thinking, and reacting. Listening requires interpretation of a sense experience received in a time sequence. It differs from reading in that one has no opportunity to stop listening, think, and reread.

In the ordinary daily conversation, talking and listening become spontaneous communicative activity. However, if one wants to think and use his imagination regarding the listening experience, he must remember what he has heard. The teacher should plan with the children what to listen to for their discussions, sharing, and planning. Careful listening is needed so that one's comments fit into the topic under discussion. Children need guidance to help them realize what other children will listen to.

Creative dramatics is unique among the arts in that it uses children as the means, social living as the material, and the correlated skills of seeing and listening with speaking and acting as the process. Under the guidance of a wise and sensitive teacher, the gifted child is given his greatest opportunity to grow in personal sensitivity toward others in a creative social situation.

CREATIVE DRAMATICS IN THE SCHOOL CURRICULUM

Creative dramatics is of great value for developing the personality of the gifted child. Drama appeals to the gifted child's imagination, and with his superior perception it motivates him to think and feel far beyond the realm of obvious reality. The power of the drama stirs the child and leads him into a world of new ideas and expanding concepts. A school curriculum which includes the area of creative dramatics gives the child a new freedom to develop his talents, abilities, and drives, rather than meeting only the routine assignments and the standards of a regular,

traditional curriculum which is geared to the majority of the children in the classroom. Traditionally, with the usual assignments completed, the gifted child is faced with idleness and, all too often, with a discontent that leads to personal problems. Such a child uses only a small part of his potential and becomes the true laggard in our schools. "It is a shocking fact that many gifted children in terms of achievement are the most seriously retarded pupils in our schools today."⁶ Creative dramatics could do much to remedy this situation.

The gifted child, through the use of his imagination, can become exceedingly resourceful. He can develop a keen perception toward solving problems, toward constructive action in unexpected happenings or in situations of emergencies. Planning and acting out and evaluating scenes in creative drama and impersonating characters outside oneself lays the groundwork for becoming a leader in society. The gifted child must be given a curriculum which includes all of the arts as well as creative dramatics, so that he may develop as a rounded person in the liberal arts disciplines. A gifted child, in order to become aware of himself and his power to contribute to challenges outside himself and to cooperate and participate with others, needs many dynamic and varied experiences. Such experiences are offered bountifully in creative dramatics.

How are the talents of the gifted developed through creative dramatics? Children play naturally. They pretend that they are different persons from themselves or they pretend that they are animals, things, or fantastic creatures in a situation related to the life of their imagination. They constantly desire to dramatize. This play acting becomes a way of learning about life and interpreting it. "What people feel about anything is more important than what they think about it. For attitudes are the moving force of life."⁷

Participation in creative dramatics and children's theatre opens up for the gifted child an atmosphere of stimulation and freedom in which his contribution will be satisfyingly dynamic and creative. He will find himself no longer bound by the limitations of others. With the help of a skilled and sympathetic adult, he will be able to relate himself to ideas, people, and his environment. His creative imagination will have full reign as he develops a character which he is portraying. He will come to know himself and to realize his own power as he lives the role which he plays in a moving plot or well-known story. He will come to believe in himself as well as in others, and he will find a worthwhile means of releasing his feelings, his ideas, his imaginings.

⁶ Marian Scheifele, *The Gifted Child in the Regular Classroom* (New York: Bureau of Publications, Teachers College, Columbia University, 1953), p. 19.

⁷ Winifred Ward, *Playmaking With Children*, 2nd ed. (New York: Appleton-Century-Crofts, 1957), p. 247.

In the nursery school and the kindergarten, play takes on new forms in the social environment of the school. Both indoors and outdoors, items used in play, such as large and small blocks for building, kegs, sawhorses, and assorted pieces of lumber, become inexpensive equipment for an endless variety of creative experiences, which reveal individual interests, dramatic sense, and mental perception. The imagination of kindergarten children forms their play activities, which is done for the fun and pleasure of the group without an audience or even an awareness of a teacher's presence. Such dramatic expression with young children is largely pantomime with a very general character awareness that is often sketchy and includes little dialogue other than an attempt at language meaning. Their first acting out of a story or some real family or neighborhood experience is basically in pantomime. Characterization and dialogue grow as children mature. As a story develops it should unfold and grow for each member of the group or class. As the child's first impressions of a story or an experience become more vivid and discerning, his dramatic expression results in character acting that is more significant and creative. Often, this expression includes a dialogue with qualities of expressiveness and spontaneity. These are the roots of the child's growing and developing vocabulary.

The use of simple conversation is a natural road to the development of dramatic play. The teacher's judgment and guidance in the group's choice of a story or an experience that is valuable and has rich resources for dramatic expression is most important. A creative climate needs to be set to give full opportunity for all children in the group to combine intellect, talent, will, and interest. This is their chance to develop emotional feeling in expressing themselves through free, spontaneous thinking, bodily movement, and dialogue.

As children of eight, nine, and ten years widen their horizons through reading and the study program of the elementary grades, they broaden the knowledge of their immediate environment and extend it to the neighboring community, state, country, and foreign lands. Often a class becomes interested and immersed in the folklore of a country and its people to the extent that class activity with significant dramatic content results. As children grow and mature, the simple and creative dramatic play of the kindergarten and the early primary grades grows into an original play with appropriate group planning and thinking regarding the plot, action, and characters. This planning often develops into a dramatic structure of extraordinary form and definite dramatic content with artistic quality.

In the intuitive and creative dramatic play activity of early childhood, the boy or girl is the character he or she is portraying at the time. As these dramatic experiences continue for older children, they become increasingly structured in content. Often the older children choose to act

in a prepared story or play. In either case, the boy or girl must lose his own identity and consciously accept a character part in the play and the responsibility to interpret this role. The older children will want to give consideration to the technical aspects of their production, such as simple stage setting, appropriate costuming, and basic lighting. The teacher should encourage the boys and girls to develop their own thoughts and feelings of the character that they are playing and to express these thoughts and feelings before their group.

One of the best ways to understand other people, cultures, and countries is through dramatization. The building of plays holds much broader educational value than selecting a published or prepared play for memorization. Much study, library research, and organization are necessary to build a background for developing an original play. The need of securing a sufficient background for building the plot, the characters, and the play sequences provides real learning situations when intelligently directed by the teacher.

Although very little, if any, scientific evidence exists today that creative dramatics and children's theatre are of great value to the gifted child, many children's drama leaders in this country believe this to be true. These leaders are concerned with the setting up of theatre experiments with control and testing of the leader and the children at frequent intervals to determine growth values. Much research is needed in children's theatre and creative dramatics. The author believes that when the worth of these values of creative dramatics is available, an increased emphasis will be placed on theatre arts programs for the gifted child, as well as for all children, in our country.

The Importance of Enrichment

The standard curriculum does not always give opportunity or answer the needs of children with special talents. The child in the primary and intermediate school years should be given an opportunity and be encouraged through his initiative and will to go beyond the offerings of the standard curriculum. An enriched program beyond the regular curriculum should include creative dramatics as an integral part of the elementary school curriculum, just as art and music are included today. "Enrichment may be defined as the substitution of beneficial learning for needless repetition or harmful idleness."^{*} For each child and especially in much greater degree for the gifted child, enrichment must not become assigned intellectual busy work in the library. One of the objectives of enrichment is to challenge the full use of the range of pupil abilities of all the pupils in the

^{*} Norma Catts and Nicholas Museley, *Teaching the Bright and Gifted* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1957), p. 37.

classroom as well as to give play to their creativity. Young children are full of creative imagination, but as they grow older they lose to considerable extent the ability to express their creative spirit. This loss is due in part to pressure for conformity from teachers, parents, or other children, and in part to the expanding, "required" curriculum. It is due also to the pressure of being forced to participate in needless formal drill and "to learn techniques of expression in a setting that inhibits expression."⁹

Enriching the drama program in the elementary and secondary schools requires setting up avenues for developing depth and breadth in the art of drama. This means involvement in the various aspects of creative dramatics, children's theatre, and the theatre program of the high schools.

For the elementary schools, enrichment in creative dramatics means experiencing and growing in a peer group which recognizes and uses each child's special abilities. The resourceful teacher helps each child and the group as a whole to discover and identify these special talents. He provides a climate for talent discovery by the group and thus develops status, extends, and gives stride to each child's performance in the social ensemble of his peers.

In the secondary schools, the drama program becomes more formal and structured to include theatre presentations of various plays, pageants, and book musicals. Enrichment in drama at the high school level means the study of dramatic literature of fine quality, acting, dance, production, and the various aspects of technical theatre. It means opportunities for original play and script writing, for the study of speech, voice and diction, and production planning. It includes laboratory experiences in a study of bodily movement, original choreography, and dance. Such enrichment involves stage design, scenery, stagecraft, lighting, makeup, and costuming. An enriched drama program provides student opportunity for program planning, directing, management, publicity, and public relations. Adapting the learning situation more closely to the level and abilities of every student should be the leading aim of the drama teacher in the theatre program.

Field Trips as Resources for Dramatic Expression

Excursions to various community resources are rich in creative dramatic potential for the elementary school classroom. For children, for example, who live in San Francisco, a trip to the *Balclutha*, the old sailing ship docked in San Francisco's harbor and maintained for public visitation, or a trip to the waterfront to see a modern ocean liner are events that make a varied and significant impression on each child. Many other excursions to such places as the old Mission Dolores, Telegraph Hill, or San Francisco's colorful Fisherman's Wharf are available. These historic sites

⁹ *Ibid.*, p. 44

are part of the tradition of early San Francisco, and while visiting, the children can be told the story appropriate to each place. For example, a trip to the Mission Dolores provides an occasion for telling the story of early California, the old Mission Trails, Father Serra and the early padres, life in the missions, and the work with the Indians. A trip to Telegraph Hill gives children an opportunity to visit scenic Coit Tower at the very summit point of the hill. The children can see both the Golden Gate and downtown San Francisco from this point. The teacher has an opportunity to tell the story of early San Francisco, and how this very place was used by the early settlers as a signal station to inform the people in the little village of San Francisco that some sailing ship was entering the Golden Gate. Fisherman's Wharf is another popular excursion place, especially when the fishing fleet is either leaving for its adventure of ocean fishing or returning with boats loaded with fish. These are only some examples available to San Francisco's children which provide a rich background for review, evaluation, narrative expression, and episodes for creative dramatic expression with significant educational values.

Every community has local resources that are unique to the community, and they should become a part of the tradition and social inheritance of its people. These provide opportunities for firsthand experience and a proper background to knowledge of distant places, peoples, and countries.

Dramatic play following excursions is very natural and spontaneous for primary grade children, and it is a basis for dramatic episodes for the older children in the intermediate grades. Evaluations of these trips by the children and the teacher often reveal that certain parts of the excursion represented current interest and concern, and further, that some of these experiences had a natural appeal for re-creation in a spontaneous dramatic episode. With stimulation from the teacher, these activities provide many learning potentials. These excursions can be correlated with social studies, language arts, and science programs. As children grow older, dramatizing several episodes into a related continuum is part of their growing knowledge. They link these experiences into a more extended play as they evaluate their excursion experiences with a growing insight, organize their perceptions, and see new relationships of people and things.

Dramatic Episodes Based on Current News Events

One day a child in a sixth-grade class brought a newspaper clipping to the classroom to share with the other children. Several in the class were already familiar with the news item, for the story had large front-page coverage. The news event, in brief, was this: A panther—a wild and dangerous animal—had escaped from the zoo in a nearby city and was wandering at large in the area. No clue of its whereabouts had been found.

For several days the children in the classroom eagerly followed the developments of this suspenseful story written up in the local newspapers. Where was the panther? Had anyone seen it? Newsmen came to the zoo to interview the keeper. Excitedly they rushed to nearby telephones to call their own newspaper offices to relay the last minute news. A layman, who owned trained bloodhounds, volunteered to lead the searching party in an attempt to find the animal. This search proved fruitless, and still there was no trace of the missing panther. Where might it be hiding? Day by day the children's interest in this story mounted. And then, the climax occurred.

The panther, in searching for food, had eaten some poisoned substance put out for him by a resident of the area several miles from the zoo. The animal had become sick and miserable. Of its own volition, it returned to the zoo to die. The zoo keeper found its body just outside the premises, early one morning.

Though the story was finished, as far as the newspapers were concerned, it continued to be of concern to the eleven-year-olds in the classroom. The teacher realized the appeal of this story to the children and the possibilities for dramatic action. He asked if they would like to act it out in the classroom.

The momentum of the children's interest consumed two weeks of choosing and organizing scenes, acting the story, and perfecting and refining it to their ultimate satisfaction.

As the children reviewed the story they chose the following scenes:

1. The panther makes his escape from the zoo.
2. The keeper of the zoo discovers the panther has escaped, he gives the alarm; he calls the police.
3. Two policemen, the layman, and the bloodhounds leave the zoo entrance to begin the search for the panther.
4. Man and his wife, suburban residents, decide to put out poisoned bait for the panther.
5. The panther roams the nearby hills; he finds and eats the poisoned food; he becomes ill and returns to the zoo.
6. The keeper of the zoo, early in the morning, finds the dead panther at the entrance gate of the zoo.

Characters which the children chose to take part in acting out this story were:

Panther
Keeper of the zoo
Policemen—4
Newspaper reporters—3
Layman
Bloodhounds—3
Suburban resident and his wife

A news story of a current narrative episode is suitable for creative dramatization only to the degree that it fits the desires and maturity of the group. Boys and girls plan dramatic structure and create dialogue, action, and character interpretation for dramatizations only when they have an understanding of the story and feel identification with its characters. In such situations each child is challenged to think, feel, speak, and convey his impression with conviction and assurance. He has an opportunity to play various roles, to assume and act all sorts of parts and characters in the story or in a reenactment of some current news event. This is the basis of original and meaningful expression that has intelligibility to the peer group. This can be achieved in each of the creative arts, but it is perhaps best unified in drama where the creative expression uses the spoken word, music, dramatic action, dance, and often graphic expression.

THE TEACHER AND THE GIFTED CHILD

In order to guide children in experiences in creative dramatics, the classroom teacher should have special training. Throughout the country more than 200 colleges and universities offer courses in children's drama. A 1957 survey, made by the College Curriculum Survey Committee, American Educational Theatre Association, estimated that more than 4,000 future elementary school teachers and leaders in creative dramatics are being trained each year.¹⁰

First and foremost, a good leader or teacher in creative dramatics should have a genuine love for children and a sincere belief and enjoyment in drama. A teacher's enthusiasm and love of drama is soon mirrored in the children with whom he works. He should know how to secure a friendly informal atmosphere in the classroom which will be conducive for the children to create and share ideas. He should be skilled in methods and understand the procedures of creative dramatics and know how to avoid confusion by helping the children plan and solve the necessary problems for acting out a story. He should know how to listen to the ideas of the children, to guide them, to summarize, and to keep the activity alive and moving. In the evaluation periods, he should know how to help the children develop positive critical thinking. He should know how to ask questions to help the children develop the dialogue. He should realize the value of sincere feeling on the part of the children and should help them develop this feeling through group activity. He should know the elements

¹⁰ Children's Theatre Conference, "A Directory of American Colleges and Universities Offering Training in Children's Theatre and in Creative Dramatics," College Curriculum Survey Committee, American Educational Theatre Association, Agnes Haaga, Chairman, August 1957, mimeographed.

with which he works, the story, the action, the characters, the dialogue, the theme or truth of the story, the setting, the time, the plot, and the conflicts within the plot. He should know the value of self-discipline for each child; he should help each child realize from the beginning that democratic, cooperative planning is needed for creativity and drama to be realized.

The classroom teacher is the person to help the gifted child expand his background. Correlation of dramatics with other subject areas is crucial. Stories full of action in the reading program may be dramatized by the gifted children or by all of the children in the classroom. A venture or incident in the area of science may become more meaningful through creative dramatics. Creative writing of poems, riddles, and stories by the children may well offer opportunity for dramatization in the classroom. Music and dance may be related to stories which are dramatized and become an important part of the dramatization.

By careful planning of the child's work and by trimming from his curriculum formal drill in subjects he has mastered, the gifted child can be given an opportunity to do research in the area of creative dramatics. The gifted child should be allotted the time to do outside reading which will help either himself or other children to understand the character who is being portrayed in a story. In this way, the gifted child can make a worthy contribution and be a definite help to the rest of his class who do not have the time from their regular work to spend in outside reading or gathering of information. Legendary heroes, characters in folklore, and characters in fairy tales can be made meaningful to other boys and girls through the efforts of the gifted child who can bring them valuable research and information which he has done on his own.

CHILDREN'S DRAMA PROGRAM IN PRESENT PRACTICE

Children's drama covering the fields of creative dramatics and children's theatre has gained nationwide recognition in the educational program of the public schools, the colleges, and the universities of our nation. James Popovich¹¹ in a research study completed at Northwestern University in 1955 reported that over 90 colleges and universities in the United States offered one or more well-organized courses in creative dramatics in their drama department and that often the material on creative dramatics was included as a part of other courses. Although creative dramatics was generally an elective, he found that a number of the insti-

¹¹ James E. Popovich, "A Study of Significant Contributions to the Development of Creative Dramatics in American Education," Doctoral Dissertation Series No. 15, 157 (Ann Arbor, Mich.: University Microfilms, 1955).

tutions included it in the drama major program for teachers, in the course requirements for the general classroom teacher, and as a requirement for recreation majors.

Many college and university theatre groups, as well as professional and experienced amateur groups, have included theatre presentations as a part of their yearly schedule by producing plays written for a children's audience and regular plays that have appeal for children. During the year of 1959, over one hundred such college and university drama departments in the United States were active in giving children's theatre plays as a part of their drama production schedule.

The experiences of children in creative dance fostered in the elementary school form the roots of modern dance used in the theatre. Many of our colleges today are offering courses in dance to drama students as a part of their dramatic training. At San Francisco State College a course is offered in theatre dance production based on student research in dance and theatre ideas with use of the spoken word and music. A more advanced course, Lyric Theatre, which is offered to drama majors, effectively combines music, movement, song, and dance in contemporary theatre.

Creative dramatics and children's theatre are well established in the drama departments of such institutions as Northwestern University, University of Pittsburgh, University of Minnesota, Columbia University, and the University of Washington. The University of Washington, under the direction of Agnes Haaga, provides a good example of a drama department which effectively incorporates courses in creative dramatics and children's theatre. Three courses are offered each year, and special courses for teachers are offered during the summer sessions. The sequence of these three courses is: (1) An introductory course in the fundamentals of creative dramatics; (2) A course in which student teachers "take over" by using class members; and (3) A course in which these student leaders go out to the community, each student teaching a group of Blue Birds, Brownies, Cubs, a Sunday school group, and the like for eight consecutive weeks, one hour each week. Two productions in Children's Theatre are offered each year which are sponsored and managed by the Seattle Junior Programs, Inc. These productions are presented in a downtown commercial theatre where approximately 16,000 children with season tickets see a total of four plays each year, two presented by the Children's Theatre of the University of Washington, and two produced by a Fantasy Fair group, who are graduates of the School of Drama. Geraldine Brain Siks is active in this program at the University of Washington. Her excellent book, *Creative Dramatics, An Art for Children*, is a valuable resource which gives many concrete examples which illustrate the scope and practice of the art of creative dramatics as it is presented at the University of Washington.

A similar kind of program, initiated in Seattle during the industrial expansion of the war years, was envisioned by Ruth Gonser Lease. She provided the leadership which helped develop creative drama in a special community project under the Seattle Junior League in 1946. Successful growth, added support from the Seattle Parent Teachers Association and the citizens of Seattle, and the full adoption of the program by the University of Washington resulted in the establishment of the Seattle Creative Activities Center in 1957. This well-organized program at the University is one of teaching the philosophy and practice of creative dramatics, guiding and working with children, and developing teachers and leaders. It is an excellent example of a community need worked out in a program which received increasing help and leadership from a large university.

Also of interest is the early and significant development of creative dramatics in the community of Evanston, Illinois through its public schools and the Children's Theatre of Evanston. This program was the result of the leadership of Winifred Ward and her vision for the art of children's drama based on a grass roots development growing out of community needs. This unique community program received the support and encouragement of Northwestern University, and creative dramatics, under the leadership of Miss Ward, evolved and became a regular part of the drama curriculum. Many of her students have caught the inspiration and the educational potential of creative dramatics and have developed new programs in various parts of the United States.

In some places the children's program has been initiated and developed by the college of the area and extended in its influence to its community. The program at San Francisco State College, which has flourished under the direction of Burdette Fitzgerald, is typical of this kind of development. The basic curriculum in children's drama consists of three courses which deal with creative dramatics and children's theatre.

The first course includes an intensive study of children's literature, with emphasis on its content and use and the techniques of story telling and creative dramatics. The second course deals with the principles and methods of creative work in drama with children. The third course presents methods in organization, analysis, selection, and production of plays for children; it is concerned with acting and directing and is supplemented with practical experience in a laboratory class for children. Sections of the creative dramatics courses are offered during the day for upper division students, and other sections are offered in the late afternoon and evening for teachers in the field who are full-time, elementary school teachers who wish to benefit by the course in creative dramatics.

This third course in creative dramatics meets for three hours once a week. During the first hour, nearly a hundred children from various elementary schools in the city and their teachers are present. The children

are divided up into groups of twelve or fifteen, and they are guided in creative dramatics experiences by members of the college class who act as leaders and take turns working with the children. The second and third hours are for the adult members of the class only. During this time, the class experiences with the children are analyzed and evaluated. Techniques are refined and teaching methods perfected for a continuum of developing leadership in creative dramatics. Two plays for audiences of children are planned and produced each year in the Children's Theatre of the College. Both adult students at the College and children from the elementary schools of the immediate community take part as actors. One play each year is prepared by college students and directed by one of the faculty members in the creative dramatics field at the College and is taken on tour to the elementary school in various cities of California's Bay Area. This gives the children outside of the area of San Francisco State College an opportunity to see in their own community theatres and school auditoriums, plays presented by the Children's Theatre.

Another development in children's drama is children's theatre organizations. A good example of this kind of development is the Children's Theatre of Palo Alto, California.¹² This organization uses children in the elementary schools and provides opportunities for developing dramatic talent and practical study in a variety of experiences such as acting, dancing, choral ensemble, scenery, lighting, costume, and makeup. Sixteen plays are presented each year, and the various experiences are distributed so that no child carries a leading role in more than two appearances. The educational objectives of the organization are for broad personal development of each individual.

APPRAISAL OF THE PROGRAM

The appraisal of the work in creative dramatics and children's theatre is one of the most important aspects of the children's drama program. This is especially true in evaluating the accomplishments of the gifted student. Evaluations are inevitable and range from offhand judgments to constructive consideration of weaknesses and strengths. Citizens, parents, students, teachers, school administrators, and members of boards of education all have personal reactions regarding the children's drama program and its place in the school curriculum. Criticisms have not always been constructive; sometimes they even show little regard for the available facts. Sometimes the program has been dubbed a new fad or frill, a judg-

¹² California Elementary School Administrators Association, *The Gifted Child: Another Look* (San Francisco, California: The Association, 1958).

ment obviously based on a misunderstanding of the program. More data, based on actual working programs, are needed. Well-defined and functional research studies that have a greater degree of validity are needed before appraisals can be made or directions can be suggested.

Of first importance is to plan evaluations and value judgments of the children's drama program at the end of periods of instruction as well as during the time that the dramatic activity is in progress. Every creative dramatics and children's theatre program should have a plan of continuous review and appraisal by the children and the teacher. This is needed to promote effective and constantly improving learning situations. Such evaluation is needed to eliminate waste of time and busy work and to increase learning effectiveness and personality development of the children. The teacher should provide every child with an opportunity for growing and developing self-evaluation. This is the time for the teacher to ask such questions as: "What was good in the work that we did?" "What might we do better?" "How could we do this in a better and simpler way and still get worthwhile results?" Such questions are excellent for developing thought and self-evaluation in creative dramatics. A recording on tape of such sessions is easy to do and becomes excellent data for analysis and study.

New approaches need to be explored for developing our gifted students. Many believe that creative dramatics and children's theatre, followed by a high school drama program, provide some of the most significant experiences for developing the gifted during early childhood, later childhood, and adolescence. We need to plan and conduct pilot studies at the various age levels in our school drama program, with careful appraisals and wise recommendations, from which advancements can be realized. In the comprehensive picture, we need to improve the ability of student, teacher, parent, administrator, and general community to develop our educational program in drama until it is based upon valid evidence and common agreement. The gifted student benefits especially from the creative dramatics and children's theatre program, for it is here that he receives social status, understanding, and a maximum of personal development necessary for happy living in the social context of his community, school, and home.

SUMMARY

Creative dramatics is an art of dramatic expression which uses the spontaneous intent of children as its medium. In its larger scope, it is part of the curriculum development in children's drama. It is an art of creative dramatic harmony; it needs and uses all the abilities and talents of the children who are in the social group. Such a normal social group of

children, with a spread in the degrees of talent, ability, and home background, is the basis of an effective and creative dramatic ensemble. Creative dramatics inspires reflection, by the child, on his various activities with things, people, and nature; this in turn sharpens the perceptive thinking and creative imagination needed to shape dramatic artistry.

Under the guidance of an adequate teacher, the gifted child can find activities that enlist and develop his full range of abilities. Creative dramatics gives the gifted child an opportunity to participate in a social group in which enthusiasm, cooperation, good will and consideration for the other person are basic ingredients. Characterization in role acting releases every child from his own self to a creative freedom in experiencing, interpreting, and evaluating all kinds of roles in many situations; this can be particularly fruitful for the gifted child.

Material for creative dramatics comes from children's literature, excursions, current happenings in the children's environment, and appealing news stories. As experiences in the activities of creative dramatics develop at successive age levels, children's theatre evolves. Along with the child's experience as part of the audience seeing a play of adult performers on a stage and later doing the actual play production, children's theatre should continue to evolve and become a rich background for further personal development of high school students in their school plays, pageants, musicals, and drama appreciation experiences.

We need more qualified teachers to give leadership in the art of creative dramatics. The training of these leaders is a responsibility of the colleges and universities. A sequence of courses in drama and theatre should be a part of the teacher education curriculum.

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CHAPTER THIRTEEN

Curriculum Implementation

LOUIS A. FLIEGLER

Previous chapters have exposed the reader to many curriculum concepts concerning the education of the gifted. Now we will discuss the directions a school system may take to implement a comprehensive and realistic curriculum program. Some of the ideas that were presented in preceding chapters will be restated here and integrated into a broader context. Basically, this chapter is concerned with philosophical issues, aims and objectives, curriculum considerations, a research program, and the preparation of teachers for the gifted. These are core factors in utilizing curriculum content and adaptations in order to develop a program for the gifted.

PHILOSOPHICAL ISSUES

Fundamentally, curriculum development has a philosophical frame of reference. Without a philosophy that is purposeful and directed, the end result is a vacillating and vacuous education. Today, modern education lacks a well-defined philosophy of education. As Justman states:

It is paradoxical that at a time when the educational profession contains so many specialists it should be without a strong, articulate leadership, able to explain the purposes and methods of the school in clear, convincing terms. . . . With the advances of social science and psychology within this century we should be able to mold for our schools a sounder, more tenable philosophy. . . . This we have patently failed to do.¹

Therefore, educators must retool and revitalize their thinking and formulate a philosophical structure designed to improve the curriculum for all children as well as the gifted.

In the past when programs for the gifted failed or were eliminated, they did so because of a so-called philosophical shift. The tendency to reject an educational program for the gifted was not based upon a real understanding of the issues. This was tragic, and it created the usual "band wagon approach" without developing a rationale for the change. This mistake must not be repeated again. We must formulate a sound and consistent philosophy for educating the gifted and use it as a basis for action.

First and foremost, a dynamic society must envision a greater philosophical perspective than the extant life adjustment philosophy. Life adjustment, in practice, predicates that adjustment to the environment is all that is required and assigns a passive role to the individual. In a sense, "The American emphasis upon social and emotional adjustment has been buttressed by a corresponding emphasis on security and conformity at the expense of freedom."² Too often, life adjustment assumes that man is a plastic individual with little purpose in life except to allow society to coerce him into whatever it desires. This assumption suggests that man has no place in changing the direction of society. Obviously, this contention is fallacious. Society is not a mere gross entity; it is the aggregate of many individuals whose aspirations determine its purposes. Man wants to do more than adjust, he wants to live in a society and partake of a role in structuring its future. The function of an educational philosophy should be to create a balance between the interrelated needs of the individual and those of society.

An outgrowth of the life adjustment concept is the notion of egalitarianism. It has influenced administrative grouping procedures and instructional practices and has resulted in an irresolute education. Egalitarianism has come to mean equality of opportunity for all children, this has been transposed to mean that all children should receive identical experiences rather than differentiated experiences. The fetish for identity of opportunity has brought about a meaningless democratic concept devoid of purpose. In this

¹ Joseph Justman, "Wanted: A Philosophy of American Education," *School and Society*, Vol. 83, May 12, 1956, p. 159

² Robert F. DeHaan and Robert J. Havighurst, *Educating Gifted Children* (Chicago: University of Chicago Press, 1957), p. 22

subterfuge to foster democratic attitudes, individual variation has been submerged to group conformity. Little recognition has been given to the principle that difference and commonness are the foundation of a democratic society. Together they lead to greatness; separately they represent mediocrity. "Educators have too long traveled the road of commonness and given mere verbal assent to individual differences. Acceptance of the vitalistic concept of individual interests and differences is *prima facie* evidence that the educational pattern for the bright child necessitates variation in content, methodology, and administration . . ."³ A differentiated education does not imply a separate education, but it clearly strives to create experiences which build upon individual differences.

A crucial aspect of a differentiated education is whether a liberal education or specialization should receive the greater emphasis in educating the gifted. Rationally and logically, a liberal education and specialization are not incompatible, for both comprise the unity of man. To stress one aspect over the other, as is so often done, is superfluous, since both are essential for living. Basically, the prime goal is to educate the individual to fulfill his purposes and to achieve the worthy status of humanistic man. To function adequately as a citizen of the world, one must act in a humanistic fashion. On the other hand, specialization is essential for the high-order level of tasks necessary to insure a consistent pattern of progress in the space age. The practical and ethical values of our culture require individuals not only to deal with the immediate environment but to direct their activities toward a better way of life.

A basic question then evolves: What is the obligation of a superior individual to society? Limits of function are difficult to establish because man is always a part of his environment. Hence, how much freedom does an individual have in pursuing his own egocentric needs? Generally, the concept of individual freedom is stated in such a way as to illustrate that the individual has little or no relationship to society's wants or desires. This is ambiguously theoretical, not reality-oriented. To assume that the individual is a totally free agent is unrealistic. At no point can he ever make an indiscriminate selection of activities without being influenced by society or held accountable to it. The individual is always expressing some part of the environmental value system even when he is at odds with it. In disagreement, he is reflecting that part of society which desires to pursue another direction. This may be an indication of his obligation as a functioning member. But at no time is he free to reject society because, in a sense, he rejects himself. Consequently, gifted children must be educated for responsible community action.

³ Louis A. Fliegler, "Some Problems in Educating the Superior Child in the High School," *Frontiers of Secondary Education*, Paul Halverson, ed. (Syracuse: Syracuse University Press, 1960), p. 47.

Our society expects that each of these developed personalities will contribute his share to its maintenance and improvement. These personalities cannot be educated for withdrawal from society or for detached, indifferent observation of the social scene. A democratic society cannot afford the luxury of such aloofness on the part of any of its citizens, and certainly not on the part of the most intelligent segment of its educated members.⁴

Freedom is then an obligation as well as a right to follow a specific path designed to increase measurably the intrinsic worth of the individual. The preservation of individual freedom becomes significant when it is conceived as a freedom of choice within the context of a fiduciary relationship toward society. In this framework, the gifted can help shape the design of society and contribute to its welfare.

The implications of a contribution must be assessed in terms of the needs of the group. It is a *sine qua non* of existence.

The maximum welfare for a group is achieved when each member of the group contributes as much as he is able. Although every individual has an obligation to contribute, those who have a large capacity to contribute carry a larger obligation than those whose capacities are small.⁵

It follows conclusively that the gifted child should by virtue of his ability make a superior contribution. The gifted student should be informed of the critical intellectual, economic, and social requirements of society so that his socio-political and vocational choices may be in keeping with his role as an effective citizen. This is not to be construed as an attempt to make everyone a scientist or to coerce anyone in one way or another. This does suggest that the individual will receive opportunities for maximum growth, be aware of the requisites of society, and have the freedom to select a role that is commensurate with his abilities and interests which are needed to mold a new environment.

Accepting the premise that the individual has an obligation to society and that society's needs and those of the individual are interrelated, it follows rather definitively that a philosophy of education must be "living centered." Not only is the school environment life itself, but the school provides a way to restructure life in keeping with the individual's desires. The accent is on an activistic milieu that is essentially creative. The movement is consistently forward into the future while, at the same time, dealing with the present. Adaptability and recombination, not adjustment, are the touchstones of a "living centered" philosophy. Education, in the last analysis, should be time-extended, not time-bound.

⁴ Will French *et al.*, *Behavioral Goals of General Education in High School* (New York: Russell Sage Foundation, 1937), p. 28.

⁵ Educational Policies Commission, *Education for the Gifted* (Washington, D.C.: National Education Association, 1950), p. 2.

AIMS AND OBJECTIVES

Confusion exists as to the difference between aims and objectives. A distinction should be made between the two. These terms are not synonymous, but they are interrelated.

Aims specify the global philosophical format which embodies in broad terms the scope of education. They are the basic beliefs and values of society that represent the social direction of society. They are the educational goals which are the same for everyone. The avenues through which goals are realized depend upon the community, the school organization, teaching and administrative personnel, and available resources. More specifically, the techniques and methods for achieving aims may differ between rural and city settings, socio-economic levels, large and small school systems, values of the community and attitudes of educators, and individuals of varying capacities and abilities. Thus, the processes for attaining the aims of education will substantially differ for individuals as well as for groups.

Objectives, which emanate from aims, determine the focus of education. The content and learning experiences which stress individual variation flow directly from the objectives and provide immediate direction for the teacher and the pupil. Objectives distinctly express in psycho-educational terms the behaviors, needs, and outcomes of the educational process. They are the measurable and evaluative aspects of curriculum organization from which change in behavior patterns is determined. Descriptive statements are preferred in formulating objectives. Judgmental values are to be avoided because they appropriately belong in the derivation of aims. Bloom *et al.*, in organizing a taxonomy of educational objectives, state quite specifically:

It was further agreed that in constructing the taxonomy every effort should be made to avoid value judgments about objectives and behaviors. Neutrality with respect to educational principles and philosophies was to be achieved by constructing a system which, insofar as it was possible, would permit the inclusion of objectives from all educational orientations. Thus, it should be possible to classify all objectives which can be stated as descriptions of student behavior.*

Many educators are skeptical of tampering with aims and objectives. Aims and objectives are not inflexible elements of society. Nothing is sacred about them. They are subject to the same critical scrutiny as any other facet of the educational milieu. Their re-examination is consistently necessary for a dynamic society because values, attitudes, and concepts should be altered to cope with existing demands of life. As society changes in structure and purpose, aims and objectives should closely adhere to the new perspectives of society.

* Benjamin S. Bloom, ed., *Taxonomy of Educational Objectives* (New York: Longmans, Green and Co., 1956), pp. 6-7.

The relationship of aims and objectives to curriculum merits some consideration. Although they are related and created from the same social fabric, they represent a different emphasis in structure and content. Aims and objectives are the extensive guidelines from which the substance of curriculum emerges. Curriculum is the means through which the aims and objectives are brought into focus; it facilitates content and activities which are planned in the direction of achieving educational goals.

The fundamental decisions as to the design for education must first be made in aims and objectives. To be specific, aims and objectives should provide the direction for curriculum content. The secondary decisions are those related to the phases or activities in the curriculum which are patterned to attain the purposes of education. Far too often, greater concern is shown for the curriculum which is direct and immediate than for the over-all scope of education. The consequences of this emphasis are confusion and distortion regarding the substance of education. The means for achieving a certain goal become more important than the goal itself.

Objectives for the Gifted

If education is to accentuate diversity, "Genuine differences in school experiences appear only as specific objectives are crystallized for gifted individuals."⁷ Objectives for gifted children are in the beginning phases of development. The rationale for these objectives is determined from the different specific intellectual, social, and vocational goals of the gifted which, in turn, necessitate a differentiated program. If the gifted are our potential leaders and much of society's progress depends upon them, then they require individualized objectives relatively different from those of the intellectually normal or the slow learner. This difference is one of degree not of kind.

A substantiation of this fact can be readily seen upon examining a list of objectives which were formulated by the California Elementary School Administrators. The broad areas ranked in order of importance encompass effective thinking, basic skills, citizenship, understanding of environment, appreciation of beauty, world understanding, character and human relations, vocational competence, leisure time, health and safety, successful family life, and consumer effectiveness. The specific objectives which have the greatest significance for gifted children are as follows:

1. Recognizes a problem and defines it clearly.
2. Thinks in terms of the whole and sees parts in relationship to the whole.

⁷ A. Harry Passow, "Enrichment for the Gifted," *Education for the Gifted*, National Society for the Study of Education, 57th Yearbook, Part II, N. B. Henry, ed. (Chicago: University of Chicago Press, 1958), p. 194.

3. Gathers and studies facts about a problem, distinguishing between fact, opinion, and propaganda.
4. Learns to use sources of information effectively.
5. Weighs evidence, makes inferences, and draws conclusions.
6. Checks his conclusions for accuracy, modifying his thinking as the evidence dictates.
7. Detects within himself and tries to overcome such things as subjectivity, rationalization, projection, and prejudice, which inhibit effective thinking.
8. Does creative thinking, such as using the imagination and uniting the thinking of a group to form a new concept.
9. Checks information with facts.
10. Searches for the meaning behind the number or the numerical relationships he uses.
11. Understands methods of checking computed results and uses these methods in checking problems.
12. Accepts responsibility in group undertakings and in civic affairs.
13. Applies his knowledge of such subjects as history to the understanding and solution of community, state, national, and world problems.
14. Develops ability to detect and analyze propaganda in public affairs.
15. Recognizes the possibilities of improving environment through scientific and industrial development.
16. Realizes the powerful social and economic implications of atomic energy.
17. Acquires a store of knowledge and understanding concerning science.
18. Realizes that education is a powerful force in alleviating misunderstandings, tensions, and persecutions arising out of variations in peoples and their cultures.⁸

Realistically, these objectives apply to all children. The emphasis upon variation occurs within the various facets of each objective because the greater potential ability of the superior child increases the extent of concepts and proficiencies which can be developed. Consequently, the objectives for gifted children differ from those for other groups of children in the degree of quality and excellence expected.

CURRICULUM CONSIDERATIONS

Curriculum content is the basis upon which education of the gifted will be meaningful or meaningless. Its complete development depends upon numerous factors. Consideration must be given to the superior learning potential of the gifted, as well as to the aims and objectives of education. The advanced developmental and learning rate of the gifted child and his societal needs impose the framing of new dimensions in curriculum

⁸ California Elementary School Administrators' Association, *The Gifted Child: Another Look* (San Francisco: The Association, 1958), pp. 13-14.

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3. Gathers and studies facts about a problem, distinguishing between fact, opinion, and propaganda.
4. Learns to use sources of information effectively.
5. Weighs evidence, makes inferences, and draws conclusions.
6. Checks his conclusions for accuracy, modifying his thinking as the evidence dictates.
7. Detects within himself and tries to overcome such things as subjectivity, rationalization, projection, and prejudice, which inhibit effective thinking.
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9. Checks information with facts.
10. Searches for the meaning behind the number or the numerical relationships he uses.
11. Understands methods of checking computed results and uses these methods in checking problems.
12. Accepts responsibility in group undertakings and in civic affairs.
13. Applies his knowledge of such subjects as history to the understanding and solution of community, state, national, and world problems.
14. Develops ability to detect and analyze propaganda in public affairs.
15. Recognizes the possibilities of improving environment through scientific and industrial development.
16. Realizes the powerful social and economic implications of atomic energy.
17. Acquires a store of knowledge and understanding concerning science.
18. Realizes that education is a powerful force in alleviating misunderstandings, tensions, and persecutions arising out of variations in peoples and their cultures.⁸

Realistically, these objectives apply to all children. The emphasis upon variation occurs within the various facets of each objective because the greater potential ability of the superior child increases the extent of concepts and proficiencies which can be developed. Consequently, the objectives for gifted children differ from those for other groups of children in the degree of quality and excellence expected.

CURRICULUM CONSIDERATIONS

Curriculum content is the basis upon which education of the gifted will be meaningful or meaningless. Its complete development depends upon numerous factors. Consideration must be given to the superior learning potential of the gifted, as well as to the aims and objectives of education. The advanced developmental and learning rate of the gifted child and his societal needs impose the framing of new dimensions in curriculum

⁸ California Elementary School Administrators' Association, *The Gifted Child: Another Look* (San Francisco: The Association, 1958), pp. 13-14.

content. This curriculum cannot be watered-up from the intellectually normal, but it must delineate a new level of presentation of ideas which are commensurate with the superiority of the gifted individual. The alignment of superior characteristics with curriculum content necessitates the formation of a different developmental program.

Many educators have been at a loss as to how they can work with gifted children. Part of the problem has been the resistance to a basic preconceived curriculum content which takes cognizance of individual needs. This, some educators feel, detracts from the flexibility of the curriculum. This is incongruous because no curriculum content is ever complete or fixed. The element of individual interest and spontaneity of predilections are always factors to be considered. However, some preplanning of content ideas is necessary to cope with individual learning potentials and the quest for ideas. Teachers need some guidelines for subject-matter to integrate ideas and to avoid much of the haphazardness that is evident in the classroom today.

To develop subject-matter guidelines is important and not necessarily restrictive. The limitations are not in the content but in the methodology for teaching it. This occurs when teachers follow the content rigidly and do not allow individual expression and interpretation. The function of methodology should be the continuous expansion of the environment through individual variation of content for each learner. Where creative expression is permitted, the learner tends to select his own activities to provide a continuity of experiences. Continuity is an internal as well as an external affair; it depends upon the environment and the opportunities which permit individualization. The sequence and integration of these experiences consistently have a broadening effect upon the curriculum.

Unfortunately, too many educators conceive the curriculum approach for the gifted much too narrowly. The requisites for proficiency have become almost standardized. To achieve adequacy, it is assumed that every gifted child needs a set curriculum. Little opportunity is permitted for diversification.

At present, the primary mode of curriculum adaptation is through the addition of course work culminating in a longer period to be spent in school. Witness the recent upsurge for a longer school day, extended school year, Saturday classes, and summer school. These adaptations are disturbingly ineffectual. The notion that the easiest way to adjust for differences is by the "adding-on" concept, which is conceived as enrichment, is essentially erroneous. It becomes too easy to add a course without thinking through the result upon the economy of learning. Also, the accretion of courses increases unnecessary anxieties. The fact that the gifted child can "take it" is no justification for the burgeoning of courses. Where is the goal of a balanced life in this concept? Since the function of education is to create an individual with many interests, the overemphasis upon intellectualism

represents an extreme position, almost as invidious as the overemphasis upon life adjustment.

The issue becomes more pronounced when we consider that man will need more knowledge to function in the world. If the main solution for meeting this problem is through proliferation of course work, where will the point of no return be? This is a dilemma which needs to be resolved now.

Inherent in the "adding-on" concept is the fallacious dichotomy of required and elective courses. The acceptance of elective courses as an integral part of education is stifling to the imagination and a creative education. If teaching is fundamentally the engendering of ideas, how can an idea be elective? If the purpose of education is to educate the whole child, the distinction between required and elective courses is at best artificial and illogical. Primarily, the compartmentalization of subjects presents a basic hindrance for positive curriculum development. Subject barriers are considered immutable, but the staticity is educator-made and does not derive from the subject-matter. There is no apparent reason why curriculum developers are unable to ferret out basic content from the various academic subjects and integrate them into a core of ideas.

A more feasible approach to curriculum content is telescoping. The hub of telescoping is the development of sequential ideas to assure maximum learning under the most efficient conditions. Telescoping assumes that ideas flow from each other and transcend subjects. The ideas are developed from content so that the material is presented more judiciously in keeping with the learner's capacities and abilities. These concepts are continuous and integrated, not merely compressed in order to save time. The purpose is to achieve order and unity in the learning experience. "A sense of unity is not restored to education simply by reorganization of subject matter, or by new courses."⁹ It is attained by integrating major ideas of experience into threads of learning. "*Integrative threads should be sufficiently comprehensive to extend over the entire range of subject matter or experience in some area of human endeavor.*"¹⁰ The ultimate purpose of telescoping is the integration, not fragmentation, of ideas extending over the wide gamut of man's knowledge.

In telescoping, two basic notions evolve: (1) core ideas and (2) individual ideas. Core ideas represent the common themes of information which

⁹ Paul L. Dressel, "Integration: An Expanding Concept," *The Integration of Educational Experiences*, National Society for the Study of Education, 57th Yearbook, Part III, N. B. Henry, ed. (Chicago: University of Chicago Press, 1958), p. 258.

¹⁰ Benjamin S. Bloom, "Ideas, Problems, and Methods of Inquiry," *The Integration of Educational Experiences*, National Society for the Study of Education, 57th Yearbook, Part III, N. B. Henry, ed. (Chicago: University of Chicago Press, 1958), p. 97.

exist in knowledge. They are the centrality of ideas or fundamental concepts which are necessary to function effectively in a complex society. Examples such as communication and human relations are illustrative of the point. All subject-matter areas can be interwoven into these broad facets of learning. Obviously, variation in core ideas will exist because ideographic responses are always operating, but the differences are built upon commonness. Individual talent and interest impel further differentiation in conceptualization. This is essential in order to amplify the talents of the superior child and the opportunities for individual exploration of ideas.

Clearly, the telescopic approach to curriculum is more beneficial than the "adding-on" approach. The emphasis upon integrated ideas rather than the time sequence of subjects permits the unification of ideas, the optimum use of time, and the greater opportunity for creative expression. Teaching with ideas is the most expeditious way of stimulating the gifted child. Most important is to recognize that telescoping enhances the development of the kind of individual our democracy needs.

The viewpoint which has been expressed recognizes that some advancements have already been made in the prominence of core curriculum, though not enough, and in the retooling of mathematics, science, and foreign languages. Notwithstanding these advances, new and different thinking must evolve for educating the superior child. Coping with individual differences necessitates not only the creation of fruitful experiences, but the economical use of time in order to achieve maximum learning. Any watering-up of curriculum or merely increasing the work load is deleterious to sound growth patterns of the individual. *The quintessence for educating the gifted is curriculum differentiation—a differentiation based upon the needs of the child.*

Blocks to Curriculum Improvement

Curriculum bridges the past, present, and future experiences of an individual. In actual practice, too much attention is paid to the past and present and too little to future trends. Although the school reflects the traditions of society, it must undertake the role of teaching those aspects which will improve society. The element of prediction is inherent in curriculum because it must foster those ideas which will be necessary to life in the future. The implications of such an objective are far-reaching. Such an objective necessitates consistent curriculum evaluation and modification. Indubitably, the evolvement of curriculum revision is a complicated task.

Curriculum reorganization has many blocks. The reformulation of curriculum is difficult because of the lack of adequate research, the abundance of outmoded concepts, encrusted attitudes, and directionless apathy. Very

often there is a wide gap between verbal sanction and putting thought into action. It is probably more convenient to talk about something and find errors in thinking than to explore new avenues for rectifying old behaviors.

The vested interests content with maintaining the status quo represent a powerful factor in hindering innovations. They feel that obstruction is more comfortable than construction. Their activity is directed with a purpose and plan to deter any action that is beneficial to the community and deterrent to their interests. However, vested interests represent only a small minority who place barriers in the way of progress.

A much larger group of obstructionists can be found among the educators and "solid" lay people who are essentially fearful of instituting new curriculum ideas. Their reasons for objecting to change are oftentimes inane. A lack of initiative is usually the cause when educators and members of the community project their own failings in the situation onto others. A defensive credence is implied when one remarks, "This can't be done in my school because the community won't permit it"; or "How can I ever get my teachers to accept that line of thinking"; "That just isn't practical because my situation is totally different"; or "Why bother; this educational system was good enough for me, and it certainly is good enough for my son." The individual fails to recognize that a good idea is a good idea anywhere but that in practical application each school must develop its own unique style. There is almost a predisposition to action, for new events and choices may reflect weaknesses rather than strengths. Transition to different modes of behavior is not seen as building a sounder foundation but as the highlighting of defects in a situation. Rather than evaluate the idea to see how it can work, a barrier is established which precludes any incursions upon the current state of affairs.

This generalized apathy seems to enshroud any desire for originality because any change in a condition eventually and inevitably brings about a change in oneself. The perception of self has been formed in the experience and solidity of the past. As transition comes about, the self is altered; this may be a painstaking process because of the fluid situation. The transfer from old to new concepts presents a marginal area of indecision. The solid ground for making decisions just does not exist because there is no experience from which to cull information. "It hasn't been tried before" creates feelings of doubt. The fear of being wrong provokes anxieties which are difficult to control.

Attitudes present another obstacle to curriculum improvement. Overt attitudes that have been accepted through the years become dogma. It is easier to believe what you already know than to challenge old ideas. The pattern of regularity or stagnancy serves as a powerful psycho-social support. Concurrently, hidden attitudes offer resistive force to change. These

are sometimes more powerful because the real reasons for inhibiting new concepts may not come to the surface. These are the guarded empires of thought which reflect an interest in self, not others.

Strangely enough, past success may impede innovations. Ideals and concepts which have been developed through the years are taken for granted. Here, the educator has concrete reasons for building his rationalizations. The evidence is on his side. The issue is not how we can improve what already exists, but why bother—everything is functioning smoothly. This is an instance when feeling right is glibly transposed to being right.

Essentially, functioning in the habitual pattern is safer than initiating change. Any innovations bring about imbalances which may create anxieties and upset one's equilibrium. Yet, an education that attempts to improve patterns of society and alter ideas must stimulate insecurity as well as security. The stress, of course, is on security, out of which desire and necessity for change provoke some insecurity. This is a positive reaction to delving into unknowns or peripheral areas of action without being sure of consequences.

Organizing for Curriculum Change

Fundamentally, curriculum reorganization is a social engineering process in re-examining concepts, attitudes, values, ideals, and relationships. It must emerge from a desire on the part of the community and school to want change. Both must be willing to enter into a conjoint relationship in searching for different ways to educate children. To be effective, this reorganization must be a total evaluation of existing practices and a full willingness to create new practices in the light of additional evidence.

The inclination for revision arises from prevalent dissatisfaction with the present curriculum. This must be expressed by people who feel that they have an important stake in the outcomes of education. Since people generally change slowly, bypassing or cutting corners must be avoided or barriers to improvement will be erected. Although progress may be slow and replete with difficulties, the end-product will probably receive greater acceptance and encouragement. Widespread involvement and participation is most apt to generate understanding. A deep-rooted curriculum problem with its many ramifications requires a cautious and systematic approach. It necessitates precise procedures in working through the aspects which are inherent in any change.

An adequate curriculum improvement program is fundamentally a common pooling of ideas and efforts rather than an imposition from external sources. Curriculum development is an internal affair; the curriculum cannot be transplanted but must grow from within. The permeating atmosphere is one of democratic interchange of ideas, mutual respect between people

and their judgments, and an environment which encourages experimentation. People who have a role in application must have a role in curriculum decisions. Learning and action proceed simultaneously. Each individual must feel that his contribution is significant, and that it is received in a spirit of cooperation. Flexible goals and openmindedness are the broad foci for fostering positive innovations in practice.

Who should assume a position of leadership for initiating curriculum study? No one answer is correct. It would seem most practical that the school personnel should be the primary motivational group for curriculum revision. However, with the many forces that partially control the school and the magnitude of present-day events, assigning this function to any specific group is difficult. In some instances, it may be the school, or the community, or a national accreditation committee, or national educational committees. Often a combination of these groups may stimulate the request for thorough investigation of the curriculum. The danger occurs if one group coerces another. Nothing will be accomplished without mutual consideration of all the problems. Real growth of ideas and patterns emerges from searching experiences in a democratic atmosphere. But, regardless of the initiating unit, the local school and community must bear the responsibility for examination and reconstruction of the curriculum.

To circumvent unnecessary delay and hostilities, a wise strategy is to invite an outside consultant to act as a catalyst when local study groups scrutinize the curriculum. The catalyst can note impartially the positive and negative indices and the agreements and disagreements without becoming immersed in emotional conflict. Once surface difficulties have been identified, further examination is necessary to uncover problems less easy to diagnose. People often lose perspective of behaviors which are close to them and overlook other areas that bear strongly on the situation; a catalyst lends objectivity at this point.

A list of immediate and long-range problems should be established to determine an order of study. To expedite action, immediate problems are most easily evaluated first. Long-range problems, which encompass a wider scope, should be investigated over a protracted period.

The next step is to decide which groups will invest their energies on which problems. The formation of committees involves a number of dimensions. The selection of a specific committee should be in the hands of an over-all planning board comprised of educators and lay people. The committees may be organized on a formal or informal basis, but each should have a specific function and responsibility. Committees studying long-range plans should have permanent status; others involved with immediate problems can be temporary. Committee assignment should be based upon the needs and purposes of the group rather than on a personal bias. Member interests and skills are important facets to consider. At times, arbitrary

lines of function must be drawn between lay and professional groups. For example, lay and professional groups can serve on the same committee for policy determination; but in other committees, such as the construction of curriculum content, a definite separation is needed. We must recognize the limitations of lay people in this sphere. They are not trained to know the intricacies of course content.

In summary, people, not ideas or techniques, foster curriculum changes. The feeling should exist that everyone has a stake in curriculum reconstruction and a part in the formulation of decisions. Administrative dictum assumes that the "passing down" of decisions is the most feasible and economical approach, but this creates unnecessary resistance and reduces the possibility for vital growth. The opportunity to explore the workability of ideas and their impact upon the school and community is crucial. The experiences of the group are excellent reference points; they can be a sounding board for the worthwhileness of any suggestion. The group must have a common purpose and maintain a specific goal direction to achieve an integration of effort. The greater the understanding and the wider the participation of the curriculum study groups, the more effective the results will be.

Evaluation

Evaluation is the process by which a school system seeks to ferret out the strengths and weaknesses of its curriculum. As an integral part of curriculum development, evaluation should be planned around objectives. Evaluation must be continuous and must be organized systematically to determine changes in growth patterns. It involves more than mere accumulation of quantitative data or the measurement of a single variant of behavior. It is concerned with qualitative information, such as attitudes, values, interests, work habits, human relationships, and other similar facets of behavior. Hence, evaluation is a total process; it is concerned with the fusion of experience involving a total description of the individual interacting with the environment. To achieve this goal, we must evaluate behavior in different situations and use diverse measures to show uniformity as well as variability.

A variety of techniques are needed to evaluate the results of instruction. Growth in learning can be measured by performance on standardized group and individual tests as well as teacher-constructed tests. The base line for growth in achievement should include pre-test performance and the expectancy potential of the youngster. Careful testing may reveal a disparity between daily growth and anticipated potential growth or an individual who is working up to grade level but below his achievement level on the basis of measured potential. Logs, rating scales, check lists, personal interviews,

anecdotal records, sociometric measures, inventories, open-ended statements, and other devices provide innumerable ways to determine teacher, pupil, and parent reactions. These measures provide more of the intrinsic personalistic data which are essential in assessing an individual. Obviously, the more comprehensive and varied the means to discover behaviors and reactions, the more purposeful and meaningful the interpretation will be.

To recapitulate, evaluation has certain guidelines which are of value in defining purposes and direction. Briefly, these guidelines are:

1. Evaluation should be planned and carried out in terms of the specific purposes of the curriculum improvement program.

2. Purposes should be precisely defined in terms of changes to be achieved.

3. The purposes of a sound curriculum improvement program evolve continuously. A high degree of flexibility is therefore necessary in evaluation activities.

4. Evaluation should be concerned with both ends and means.

5. Decisions concerning the purposes, procedures, and data to be collected should be determined cooperatively by all personnel involved.

6. Evaluation is a complex process that should be based upon an abundance of evidence obtained in many ways.

7. Evaluation procedures should not be limited to a single device or instrument. Any procedures are appropriate which provide pertinent and reliable evidence regarding change.

8. Measuring and counting are not sufficient. The essential nature of evaluation is the application of value judgments to data.

9. Evaluation should be an integral part of the curriculum improvement programs.¹¹

Since evaluation is an integral part of curriculum revision, it is also closely related to curriculum research. "Inherent in the process of curriculum research is a functional conception of evaluation. Doubtless, efforts to separate curriculum research and evaluation are futile."¹² Although separation between the two is not warranted, some distinction should be made to show where variations may occur. Specifically, random sampling, homogeneity of the population, differential treatment of the experimental group, use of control groups, generalization, and prediction are intrinsically

¹¹ J. Cecil Parker, et al., "Evaluating Improvement Programs," *Action for Curriculum Improvement*, Association for Supervision and Curriculum Development, 51st Yearbook (Washington, D.C.: National Education Association, 1951), p. 215.

¹² Robert S. Fleming, "Research and Evaluation in Curriculum Planning," *Curriculum Planning and Development*, American Educational Research Association (Washington, D.C.: National Education Association, 1957), p. 297.

essential for research but not evaluation. Fundamentally, though, the close relationship between research and evaluation is evident in aims and purposes. Both are interested in improving current procedures and measuring changes in behavior. Both contribute to each other in practice, and, in the final analysis, research grows out of evaluation and vice versa.

RESEARCH-IN-ACTION

No book on curriculum is complete without a keen appraisal of the value of research. Without research no real growth in education can occur. The lack of research on curriculum problems is one of the major drawbacks to progress in education. In too many instances, curriculum research has been fragmentary, inadequately designed, unrelated to well-defined theory, and carried out beyond the environs of the classroom with a minimum involvement of school people. Consequently, many curriculum decisions have been arrived at inappropriately.

Research Defined

What is research? Research is a technique or process for appraising the ways in which environmental factors can most effectively be utilized in achieving certain purposes. Fundamentally, it is a more objective way of assessing present practices and trying to improve upon them. It is a process of systematic examination for classifying and ordering data from a conglomeration of information. It brings facts into perspective and shows influences or causal relationships in reactions to the environment. Research instills directness of purpose and tries to reduce trial and error in learning. It seeks to eliminate waste and establish economy of effort in methodology. It seeks better answers for future action. Most assuredly, it provides us with a more effective way to make predictions, and thus, it enhances integration and balance in the environment. At best, the findings are temporary and limited because new questions emerge from the results. Therefore, research is never complete, it continues to raise further problems.

A Scientific Attitude

Basic to research is the development of a scientific attitude. A scientific attitude is a frame of reference for viewing the environment. Underlying this set is an imbued skepticism of the present order of things and an accompanying dislike for complacency. An assumption is made that the phenomenon under scrutiny, such as human behavior, can be studied to discover more information about the ecology of an individual. The purpose of collecting data is to enlighten the researcher about the complexities

... they argue that teaching is an art and that the kind of analysis made by researchers destroys the art in the act of examining it. The educational researcher, they assert, seems everlastingly to be preoccupied with the details of the surface of things, whereas excellence in teaching is not to be found there, but in the wholeness of the act, including all that is known and unknown about the people involved.¹⁴

Although one may argue most eloquently that teaching is an art and not a science, such a generalization seems to beg the point. Teaching is an art, but it is also a science. The application of the art can be based upon the findings of research and its function in creating new patterns in behavior and education. Teaching and curriculum research are highly inter-related because each emanates from the other: "The process of classroom research and experimentation is inextricably related to effective curriculum planning. Planning to improve the curriculum is a matter of modifying existing instructional practices. In the final analysis these modifications must be based on or tested by research and experimentation in the classroom."¹⁵ Curriculum development without definite research becomes pure guesswork and may be based upon fallacious opinions.

This is often the case in curriculum content. Unable to secure adequate research data on curriculum content, educators pursue their own haphazard ways. Consequently, the curriculum too often grows out of everyday activities or the individual convictions of the educator. The tendency, frequently, is to permit too wide a latitude for value judgments when making curriculum decisions. To some degree, this is understandable. The immediacy of the school situation necessitates an "on-the-spot" solution. The danger is a compounding of errors. Educators must be ready and willing to have research evaluate their value judgments and to substantiate the accuracy of their decisions. Although value judgments and research feed from each other, one should attempt to research the validity of value judgments in their application.

Curriculum research deals with the influence of curriculum on the learning experiences and subsequent behavior of pupils. Its primary task is to relate the independent variables (conditions) and dependent variables (behavior) in a functional way, and to discover how each affects the other. However, we must remember that these variables are extremely intricate and difficult to control. Added to the problem of variable control is the

¹⁴ Arthur W. Torbay and James A. Hall, "Research in Curriculum Improvement," *Research for Curriculum Improvement*, Association for Supervision and Curriculum Development, 57th Yearbook (Washington, D.C.: National Education Association, 1957), pp. 6-7.

¹⁵ J. Galen Saylor and William M. Alexander, *Curriculum Planning* (New York: Rinehart and Co., Inc., 1954), p. 503.

almost tenacious motivation for employing experimental designs which involve a single variable:

The concept of the single variable, useful as it is in physical science, is practically impossible to apply in social research. Human behavior seems to be the result of the interaction of a pattern of complex variables, many of which are difficult to discover, much less control. The most that can be accomplished seems to be to describe as fully as possible these factors in the situation and phrase our conclusions in such a way as to take the variables into account.¹⁰

Foshay and Hall state: "... critics of curriculum research argue that the classroom is an enormously complicated social situation and that it is impossible to generalize about the curriculum because any apparent learning is influenced by a great many factors unknown to (and some unknowable by) the researcher."¹¹ Undoubtedly, the social nature of the learning situation creates innumerable problems. The interactive elements in the environment, which include people, objects, and events, are rather complex because of the observable and hidden variables. Dealing with human beings in the research process will always encompass incongruities. The pure preciseness of the situation, that many experimenters desire, is not generally an inherent factor in school research. However, the opportunity for researching within the school outweighs the lack of exactness. To extend this thought further, research concerned with human beings can never be so exact that all variables are controlled for qualitative factors. In fact, three types of variables will probably always be part of a social situational experiment—the independent, the dependent, and the contaminating. The research investigator must, however, do his best to delineate controls which can increase validity and reduce contamination.

The aim of controlled research should not be a hindrance but a persistent goal to be sought. The most precise experiment always will have unknowns and indeterminates. We must work within this framework and establish the limitations of our research generalizations. The replication of experiments in different localities can demonstrate the validity or invalidity of a generalization. Although curriculum research is complicated, it should not be avoided because only through research can new educational practices evolve.

¹⁰ James A. Hall, "Some Ethical Problems," *Research for Curriculum Development*, Association for Supervision and Curriculum Development, 57th Yearbook (Washington, D.C.: National Education Association, 1957), p. 273.

¹¹ Arthur W. Foshay and James A. Hall, "Research in Curriculum Improvement," *Research for Curriculum Development*, Association for Supervision and Curriculum Development, 57th Yearbook (Washington, D.C.: National Education Association, 1957), pp. 6-7.

Educators' Resistance to Research

The word "research" usually generates a great deal of negativism among educators. Often teachers and administrators are not trained to be research-oriented or to participate in research activities. They have a set toward the practical aspects of teaching. Since they are on the "firing line," they want and need immediate solutions to their everyday problems. They cannot wait for results which are sometimes slow in coming. Unfortunately, research is a protracted process with no short cuts. This tediousness becomes discouraging for the educator who cannot foresee the implications of research.

Also, in the past, the application of research findings to every situation without analyzing the limitations of an investigation, further complicated matters and created negative reactions. Teachers who attempted to transfer *in toto* the information from a study into their classroom soon found that the procedure and results sometimes did not fit their situation. Instead of recognizing the deficiency in their own interpretations, they regarded the research as ineffectual. Such restricted perceptiveness has been an impediment to educational progress.

Fear is another factor creating a hostile attitude toward research. In education, a multitude of opinions have become accepted practice without substantiating evidence to support them. Reflecting on new procedures may suggest indecision or uncertainty. The ensuing anxieties which are aroused tend to complicate the acceptance of the research process. The possible loss of status in the eyes of the community serves as a strong deterrent to accepting a solid research program.

Educators must recognize the potentialities of research. Our society is in a constant state of flux, and constant adjustment and readjustment are needed. Education has no static order. Education means change, and if change is to occur, better it be done through scientific evidence regardless of implication.

Coordinative Elements of Research

We stress the need for curriculum research not merely to resolve current problems but to affect a change in practice. The intent is not to research for research sake, but to apply the findings in order to improve the educational structure. Real improvement, if it is to occur, seems most likely to take place when the research is focused on realistic school issues and is actively conducted by the persons who must implement the curriculum.

Curricula that are planned and developed without full participation of all concerned, teachers, parents, and students,—are usually ineffective. This is especially true when there are appreciable changes suggested in the

existing curricula. Changes in approaches, content and methods take place only when there are changes in thinking of those concerned.¹⁸

Teachers play an important role in a research program. They must be included not only in the planning phase but especially in the application and participation stages since the classroom is the center of the research process. To exclude teachers will reduce not only the effectiveness of the program but also the import of the results once an experimental phase is completed. To include them will of necessity impose a very definite systematic period of training in the intricacies of research methodology. Through involvement, teacher resistance will undoubtedly be immeasurably diminished. As one teacher reported:

The term "curriculum research" used to be for me a forbidding, faraway concept. To me it seemed to refer to experiments being carried on by highly trained experts in the laboratory schools of such huge universities as Ohio and Chicago—experiments reported in highly technical terms, published in scholarly journals, and regarded with great awe and wonder. . . . I cannot help but feel that this study in which I actually attempted to solve some of my curricular problems through research has been one of the most satisfying experiences in my whole teaching career.¹⁹

Similarly, administrators and supervisors must actively engage in the research projects. Their level of participation and intent is extremely essential to productive integration of results into the classroom setting. But, they should not direct the over-all research project. This function should be filled by a coordinator of research who has the necessary technical knowledge and who can achieve a more comprehensive perspective of the total design with less partiality for any particular phase of it.

The members of the community also need to be included in the research procedure. Although disagreement exists as to the specific function they can play, the controversy is primarily academic. The community cannot be excluded, because it plays a directive as well as supportive role. Little can be accomplished in curriculum research if the community does not participate in the consequences or approve of its direction.

How can each of these groups be integrated and function as a research team? The responsibility for direction is most exigent. Leadership and specific structure for the research design must come from the research coordinator. The integration of the various groups is best accomplished through the formation of committees, group conferences, and an in-service program. The sharing of ideas, proper organization aids, and the design-

¹⁸ Maurice R. Ahrens, "Parents and Staff Cooperate in System-Wide Improvement," *Educational Leadership*, Vol. 11, March 1954, p. 338.

¹⁹ Gwyn R. Clark, "My Rewards from Curriculum Research," *Educational Leadership*, Vol. 11, October 1953, pp. 46, 50.

nation of responsibility increase the knowledge of research techniques and promote cohesiveness of purpose.

Steps in the Research Process

A research program for curriculum development should follow a sequence of formal procedures. A series of prescribed steps are necessary for experimental propriety and definitive results. Unwarranted deviations only lead to unreliable and ambiguous conclusions.

The primary steps in classroom experimentation are problem exploration, analysis, and selection. First, discontent with existing practices must be investigated. The source of dissatisfaction may be internal, within the school milieu, or external, outside the school proper. Ideas which stem from the school personnel and members of the community should be elicited and crucial issues identified. Next, some integration will probably be necessary to consolidate the problem into broad issues and to reduce the number of superficial problems. This phase is referred to as problem analysis. In order to construct a hierarchy of primary and secondary problems, some restriction must be placed on which problems can be researched practically. Since limits are necessary, the selection and formulation of the statement of basic problems is pertinent. Consensual agreement on scope is important because the cohesiveness of the participants should be preserved.

The development of hypotheses is the next step in the research process. Hypotheses are projections which crystallize the purposes of the experiment. They aid the development of an orderly conceptualization of diverse questions. Here the group makes some educated guesses about the direction of their experimentation. What do they hope to find at the end of the investigation? The hypotheses should be set forth in dynamic psycho-educational statements that clarify the experimental emphasis. Although null hypotheses are used in educational research, they are not so significant as psycho-educational statements for making interpretations.

The experimental procedure, or planning how to carry out the objectives of the research, follows the structuring of the hypotheses. Here, sample and control groups, experimental instruments, and treatment procedures are selected. At this stage, a further step should be taken: "All research problems will be improved, however, if some planning and thought are spent on the problem of determining what kinds of data should be collected and how it should be analyzed in advance of involving children, schools and teachers."²⁹ These factors may create barriers, especially when

²⁹ Virgil E. Herrick and Chester W. Hanes, "Handling Data," *Research for Curriculum Improvement, Association for Supervision and Curriculum Development, 57th Yearbook* (Washington, D.C.: National Education Association, 1957), p. 97.

the group wants to start immediately, but stress on these elements will give a highly important perspective on the relevance of the investigation. Not all obstacles can be foreseen, but an advance plan and an over-all design reduce difficulties immeasurably.

Invariably, a pilot study before launching into major experimentation is valuable. Numerous advantages accrue from a tryout. First, many of the loopholes can be noted. The number of false starts inherent in research is diminished. As a corollary, the economy of such an approach is self-evident. Many of the unanswered questions of the planning phase are brought into better focus. The time lag between collection of data, analysis, and interpretation for the final experiment is reduced. Second, the atmosphere of the environment becomes changed. The tenor of the participants becomes more active. As a training stage, the pilot study is invaluable. For those experimenters who may be novices, the pilot study provides an opportunity to become accustomed to the rigors of research. It also heightens their interest in the final experiment.

After the pilot run, the final research can be undertaken. The broad aspects should be tested in different schools; the more specific ones can be investigated in the local school. Although many educational curriculum researchers prefer to designate the local school as the primary unit, this is a mistake because the generalizations which can be made are highly limited. Educational problems are never so narrow in scope that they ought to be investigated only in one school.

Data collection, citation of results, and statistical analyses are the next steps. These are usually the most arduous and time-consuming phases. Additional clerical help and machine assistance are invaluable as a means for relieving the monotonous task of recording the results and applying statistical methods. However, teachers should participate in some of this activity, for it provides an opportunity to live with the data and to clarify the interpretations which follow.

The interpretation, drawing of conclusions, and generalizations are the most crucial phases. The validity and reliability of the entire design can be brought more into focus with objective interpretations. In a sense, interpretation is the apogee in the experiment. It is the essence of what has been thought through and investigated. The interpretation and the conclusions should be based upon the findings without overextending the data. The limitations of the conclusions should always be stated. In drawing definitive conclusions, the tenability of the hypotheses should be examined, and decisions should be made whether to accept or reject the hypotheses. To attain scope and breadth in the research process, generalizations from data should be attempted because they are extensions of the conclusions to a universal population reacting to the same educational treatments.

Because research is a continuous process, new questions continually

need resolution. As information is uncovered, ideas for future experiments accrue. Researchers must project further problems for experimentation in order to provide additional data based upon the current hypotheses and conclusions.

TEACHER PREPARATION

Certainly, the foundation of an adequate program for gifted children includes a teacher who is capable of meeting their needs, interests, and abilities. The premise that a teacher who possesses attributes of giftedness is best suited to work with superior children seems obvious, but there is opposition to this point of view. Many school people contend that most good teachers are capable of handling the gifted. Such reasoning is subject to examination.

Effective teaching, to some degree, is predicated upon the positive or negative expression of attitudes toward children. Recent research evidence indicates that teachers possess certain basic attitudes in which they either accept or reject the bright child because of his superior intellect. The teacher who cannot handle the brilliant mind will feel threatened and will try to suppress it. Such action is harmful to the youngster and results in his developing a negativistic attitude toward learning. It is important to recognize the limitations of teacher attitudes, to work to alter these reactions wherever possible, but also to acknowledge that some teachers will never overcome these feelings.

In too many instances, bright youngsters are usually intellectually superior to their teachers. To offset this disadvantage, appropriate educational practice demands that a teacher have an abundance of resource material at his disposal. Resource materials are needed in any case, but the use of them as a substitute for a challenging teacher has its restrictions. Resource materials are excellent supplementary aids in the teaching process, but they do not help to develop critical reasoning by highlighting errors in conclusions or suggesting related information from other disciplines or sources. Real advances in re-examination and assessment of ideas come mainly through interstimulation and exchange of information with a teacher equally as involved and equally as capable.

The inspirational qualities of great teaching cannot be diffused in all areas. We cannot expect teachers to be all things to all children. Any such ideal breaks down in actuality, only to increase frustration for the teacher as well as the child:

The classroom teacher, enlightened though he may be, also fails to measure up to the "ideal teacher" of whom the theorist is speaking . . . For instance, it is in the nature of things that Teacher cannot be in the

four corners of the room at the same time, cannot help and guide all children at the same time nor all of the time; cannot think of all the problems, answer all questions, plan several individual or group projects—all at the same time.²¹

This is not meant to be a dismal picture, but a realistic one. Teachers, as well as other groups, have diverse intellectual abilities and interests. Where talent and motivation are not intrinsic qualities, intense feeling for ideas cannot be artificially produced. An individual teaches best what he enjoys.

Thus, a gifted child needs a teacher who understands him and can stimulate him to optimum achievement. What qualities should a teacher of the gifted possess? The answer is not a simple one because no conclusive research has been done to clarify the issue and provide a basis for making decisions. However, the following general and specific qualities are worth mentioning:

1. A high degree of intellect and reasoning ability is necessary. It is recognized that superior minds flourish best in the presence of other superior minds. The teacher must enjoy the world of ideas and the challenge of dealing with abstract symbols.

2. The teacher should possess the techniques for effective teaching but also the content to round out his teaching equipment. A bag of tricks is no substitute for proficiency in subject-matter. In short, the teacher must know his subject.

3. The teacher should appreciate and understand the interdependence of a liberal education and vocationalism. He should recognize that progress in life depends upon the nature of ideas and the way in which they are applied to solve the problems of existence. The maintenance of a balance between a positive identification with knowledge and the individual's vocational and social needs is imperative.

4. A positive attitude should be expressed toward teaching the gifted. The vital aspect of an expressed liking for the challenge presented by bright children is necessary. The teacher should not feel threatened; rather, he should accept the limits of his own knowledge.

5. Among many personality characteristics, flexibility is salient. The teacher must possess a flexible personality so that he can adapt to various conditions and be facile and mobile in encouraging freedom of expression.

6. A creative ability is necessary to guide and release creativity in others. The core of teaching the gifted is developing a creative environment. Rather than teacher-dominated or pupil-dominated situations, an idea-dominated situation should be paramount.

²¹ Arthur M. Selvi, "Preparing Teachers for the Education of the Gifted," *Educational Administration and Supervision*, Vol. 39, December 1953, pp. 493-94.

These qualities represent the barest beginnings in trying to construct a composite profile of a teacher for the gifted child. The crux of the problem is to define in what ways the teacher of the gifted child should differ from other teachers. This is an important issue which needs to be examined through experimentation.

A curriculum in teacher education for teachers of the gifted should be at the graduate level. Placement of the program at the undergraduate level, which is often proposed, is inadvisable. There just is not sufficient time at the undergraduate level to prepare a teacher who will have a solid background in liberal education, an understanding of the process of education, and experience with intellectually normal children.

The preparation of teachers for the gifted urgently needs attention. At present, few universities have established graduate programs in the area of the gifted. Only partial solutions have been accomplished through the organization of minor specific course units and some field experience. A complete course sequence has not been formalized because of the inability to establish a basis for a teacher education program.

A number of misconceptions have consistently blocked a special program for teachers of the gifted. The erroneous premise that any good teacher can instruct the gifted is an initial barrier. This contention has been previously debunked. In addition, the overemphasis upon techniques or gimmicks has tended to reduce the importance of content. The "know-how" has overshadowed the "know-what." To pursue this direction for teachers of the gifted is incomprehensible. Although methodology is important, the teacher of the gifted should possess more content and depth than the teacher of the regular grades. Conceivably, methodology and content are coexistent factors; one cannot substitute for the other. A teacher education program should bring these factors closer together.

As a general format, the teacher of the gifted should be well-grounded in the general education sequence and related professional courses in psychology and child development. The specific courses for specialization are:

1. "The Psychology and Education of Gifted Children"—The content includes historical overview, philosophical orientation, manpower needs, nature and characteristics, program development in elementary and secondary education, identification and selection, patterns of administrative and learning adaptations, the underachiever, counseling and guidance aspects, the preparation of teachers, the community as a resource, and the process of creativity.
2. "Curriculum and Instruction of Gifted Children"—The content encompasses an orientation to curriculum areas and the interrelationship to methodology and learning theory.

3. "Practicum in the Education of Gifted Children"—The content entails observation and student teaching of gifted children.

4. To insure more content information, special courses in science, mathematics, foreign languages, social studies, and language arts should be offered. *These courses should be titled "Science for Gifted Children," "Mathematics for Gifted Children," and so forth.* Enrollment in these courses will depend upon personal interest and goals.

5. "Research Problems in the Education of Gifted Children"—The content emphasizes an overview of research problems in the psychology, sociology, and education of gifted children and the implications for classroom management.

These curricular experiences definitely make teacher preparation for gifted children a distinct area of specialization.

Higher education does not have the sole direction of teacher preparation in the area of the gifted. State departments of education have an equal responsibility. Failure to recognize that a special teacher is necessary for the gifted is reflected in the limited number of states which require certification. Certification is not a curative for good teaching, but it does indicate a cognizance of standards to be maintained. Wilson,²² in attempting to discover the awareness of the need for teacher training existing at the state level, found that 26 per cent of state elementary school superintendents and 30 per cent of state secondary school superintendents favored special training for teachers of the gifted. However, at present, only two states, Indiana and Pennsylvania, have instituted special requirements for teacher certification. A gap exists between the desires of administrators and the actual situation in which they must function. Perhaps special training and certification are not perceived at the same level. As a positive trend, a number of states have recently established positions for administrative heads in the areas of the gifted, and this may result in an increase of certification laws for teachers of the gifted, which is sorely needed.

As a part of Wilson's study,²³ he also surveyed the city superintendents about their opinions concerning specific training for teachers. Twenty-nine per cent of the elementary school superintendents and thirty-one per cent of the secondary school superintendents favored special work for the teachers in the area of the gifted. Yet upon further inquiry, he found that only a small group was doing anything to facilitate teacher preparation. Here again the hiatus between what is desired and what is being done indicates the lack of substantial action to help prepare teachers.

With the apparent lag of adequately prepared teachers, a local school

²² Frank T. Wilson, "Preparation for Teachers of Gifted Children in the United States," *Exceptional Children*, Vol. 20, November 1933, p. 79.

²³ *Ibid.*, p. 79.

system must fill the void with an in-service program of its own. Participation in an in-service program occurs at two levels. The more general level is geared to the majority, if not all, of the teachers and administrators who need to become familiar with the total program. The more intensive level is designed for teachers and administrators who have the responsibility for the education of the gifted child. Study committees, teacher institutes, off-campus workshops, and teacher exchanges are several methods now used to equip the school personnel with information about the gifted. Initially, the direction and guidance in these approaches should be provided by consultants. A neighboring university often provides valuable consultant services on how to retrain teachers, as well as curriculum development, evaluation, and research. However, to coordinate and provide continuity in the in-service program, the employment of permanent personnel is necessary.

The appointments of a resource coordinator and an itinerant teacher offer special means for immediate assistance and the direct contact to the teacher which may not be within the purview of the consultant. Many of the functions assumed by the consultant can be assigned to the resource coordinator once the program is under way. Whether a school system wants to employ a resource coordinator and an itinerant teacher depends upon the size of the school system, the extent of the educational program, and available resources. In any case, either one is needed to reduce the deficiencies in the classroom and to develop a sequential instructional program.

SUMMARY

The future of our nation depends upon the utilization of the potential of all superior youth. Personal opinions and philosophies must be re-examined in terms of individual and societal needs. Educators and communities must unite their resources and assure more purposeful objectives. New dimensions in curriculum content and teacher preparation must be pioneered and more meaningful directions established. To avoid the haphazardness of trial and error, a research program is essential.

Central to a sound program for the gifted is an educational milieu which affords opportunities for creative expression in the exploration of new ideas. Quite candidly, the mind of the gifted is literally untapped. If creative expression is stimulated, many of these youngsters will undoubtedly exceed their anticipated intellectual and social limits. To attain this expanding vista of achievement, educators must develop new curriculum concepts that will lead to maximum growth of the gifted.

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